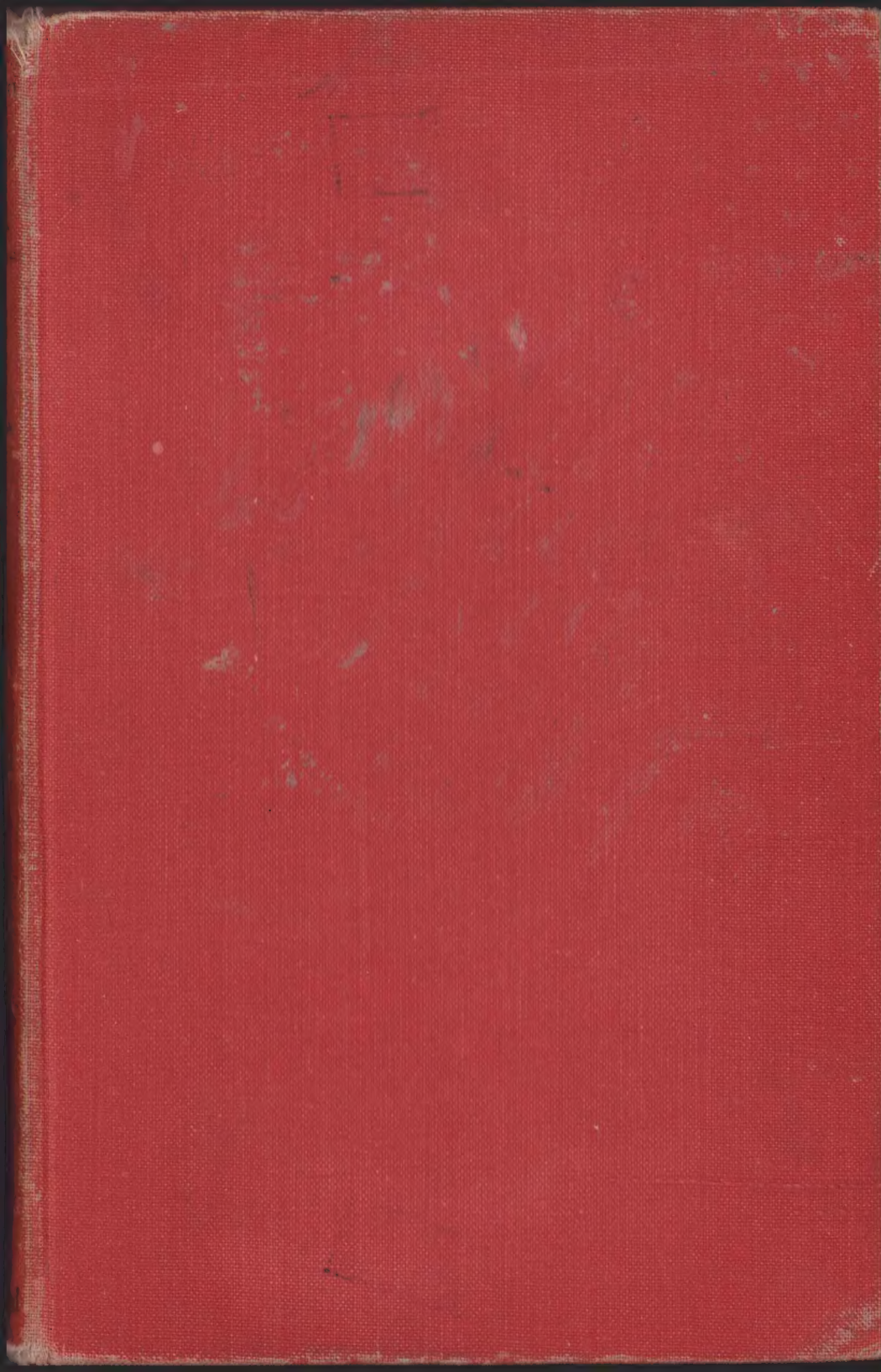




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CHRYSANthemUMS IN PICTURES

Chrysanthemums in Pictures

BY

JOHN WOOLMAN



JOHN GIFFORD LTD

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CONTENTS

<i>Chapter</i>	<i>Page</i>
<i>Introduction</i>	II
1. HISTORY OF THE CHRYSANTHEMUM	13
2. RETARDING OR ACCELERATING FLOWERING PERIODS	15
3. NEW JAPANESE FANTASIES AND OTHER TYPES IN JAPAN	17
4. CHRYSANTHEMUM STOPPING AND TIMING	20
5. THE PROPAGATION OF CHRYSANTHEMUMS	26
6. SOILS, COMPOSTS AND FERTILIZERS	32
7. CULTIVATION OF LARGE EXHIBITION CHRYSANTHEMUMS	36
8. ANEMONE-CENTRED CHRYSANTHEMUMS FOR INDOOR FLOWERING	48
9. POMPONE CHRYSANTHEMUMS, NOVEMBER FLOWERING	50
10. IDEAS ON POTTING AND WATERING	51
11. EARLY FLOWERING CHRYSANTHEMUMS	57
12. CUTTING, PACKING AND EXHIBITING	75
13. LATE FLOWERING SINGLES	79
14. CULTIVATION OF INCURVED VARIETIES	84
15. PERPETUAL FLOWERING CHRYSANTHEMUMS	88
16. KOREAN CHRYSANTHEMUMS	89
17. OUTDOOR POMPONE CHRYSANTHEMUMS	90
18. EARLY SINGLE CHRYSANTHEMUMS	92
19. CULTIVATION OF DWARF CHRYSANTHEMUMS	94
20. SOME MIRACLES IN CHRYSANTHEMUMS OF JAPAN	96
21. PESTS AND DISEASES	98
22. CHRYSANTHEMUM SPORTS OR MUTATIONS	105
23. CLASSIFICATION OF VARIETIES	107
24. INDOOR VARIETIES TO FLOWER IN COLD HOUSES	110
25. CHRYSANTHEMUMS FROM SEED	114
26. DECORATION IN THE HOME	120
<i>Index</i>	123

ILLUSTRATIONS

PHOTOGRAPHS

<i>Plate</i>	<i>Page</i>
I. PLANT POTTED	24
II. BUD TAKEN	24
III. PLANT BEING STOPPED	25
IV. DEVELOPMENT OF PLANT AFTER STOPPING	25
V. CUTTING, TRIMMED AND UNTRIMMED	29
VI. ROOTED CUTTING READY FOR POTTING	29
VII. READY FOR BUD TAKING	44
VIII. TOP DRESSING	44
IX. LATERALS GROWING FROM BREAK BUD	45
X. GOLDEN CURRY	45
XI. SHIRLEY LAVENDER	46
XII. SUEZ	46
XIII. FAR NORTH	47
XIV. PINK JAP	47
XV. CONNIE MAYHEW (INCURVED) (COL.)	<i>facing</i> 48
XVI. LIMELIGHT (JAPANESE) (COL.)	.. 48
XVII. SALMON KENT (JAPANESE) (COL.)	.. 49
YELLOW DENNIS WROE (JAPANESE) (COL.)	.. 49
XVIII. BARCAROLLE (INCURVED) (COL.)	.. 49
FREDA WILSON (JAPANESE) (COL.)	.. 49
XIX. PLANT IN 6-INCH SIZE STOPPED, AND BREAKS GROWING AWAY	49
XX. LONG ISLAND BEAUTY	49
XXI. PLANT READY TO POT ON FROM 3½-inch SIZE	55
XXII. FINAL POT CROCKED	55
XXIII. PLANT IN POSITION FOR FINAL POTTING	56
XXIV. TAPPING AND WATERING	56
XXV. PLANTS SUPPORTED ON STANDING GROUND	64
XXVI. COVERING EARLIES	64

<i>Plate</i>	<i>Page</i>
XXVII. SOLIHULL CHARTER (JAPANESE) (COL.)	<i>facing</i> 64
SHIRLEY SUPERB (JAPANESE) (COL.)	" 64
XXVIII. BASILISK (JAPANESE INCURVED) (COL.)	" 64
XXIX. FRANK WOOLMAN (NOVEMBER INCURVED) (COL.)	" 65
EDITH WOOLMAN (JAPANESE) (COL.)	" 65
XXX. COVENT GARDEN (OUTDOOR VARIETY) (COL.)	" 65
XXXI. COVERING EARLIES	65
XXXII. CHATSWORTH	65
XXXIII. CHIPPENDALE	66
XXXIV. SHIRLEY VELVET	66
XXXV. ERMINE.	67
XXXVI. JOHN WOOLMAN	67
XXXVII. MAESTRO	68
XXXVIII. LUCERNE	68
XXXIX. DOREEN YULE	69
XL. YELLOW WINGS	69
XLI. REX	70
XLII. CALIFORNIA	70
XLIII. RUTH ABEL	71
XLIV. BRENDA TALBOT	71
XLV. IRENE PRICE	72
XLVI. KATHLEEN DORWARD	72
XLVII. DIAMOND	73
XLVIII. RED BILL BAILEY	73
XLIX. RED JOHN COOPER	74
L. GARDEN GLORY	74
LI. PLANT STAKED AND TIED	81
LII. NATURAL FIRST CROWN BEFORE THINNING	81
LIII. DESERT SONG	82
LIV. JEAN HENNING	82
LV. BEDOUIN	83
LVI. CRIMSON SHIRLEY	83
LVII. BRONZE MCLEOD	86

CHRYSANTHEMUMS IN PICTURES

9

<i>Plate</i>	<i>Page</i>
LVIII. MEOCA	86
LIX. GEORGE MCLEOD	87
LX. CAPT. GOFFE	87
LXI. DENISE	91
LXII. CATHIE	91
LXIII. ANNINA	93
LXIV. YELLOW CHARM	93
LXV. TURQUOISE	112
LXVI. OLIVE BELL	112
LXVII. AMBER PERFECTION	113
LXVIII. ORIENTAL	113

LINE DIAGRAMS

<i>Figure</i>	<i>Page</i>
1. STOPPING KEY	21
2. LONG AND SHORT BREAK EARLIES	22
3. GOOD AND BAD CUTTINGS	26
4. TRIMMING THE CUTTING UNDER JOINT	27
5. 3½-INCH POT	37
6. 6-INCH POT	38
7. POTTING STICK AND TAPPING HAMMER	39
8. 8½-INCH POT	40
9. CAMPBELL'S SULPHUR VAPORIZER	42
10. METHOD OF STAKING IN FINAL POTS	53
11. STRAIGHT ROSE AND FAN ROSE	53
12. SUPPORTING A ROW OF PLANTS	54
13. POST AND WIRE STAKING METHOD	59
14. SHADING OUTDOOR PLANTS	61
15. PACKING FOR EXHIBITION OR MARKET	76
16. TYING IN LARGE EXHIBITION BLOOMS IN HURDLE BOX	77

<i>Figure</i>	<i>Page</i>
17. MIDGE	101
18. LEAF MINER AND FLY	101
19. MOSAIC AND RUST	103
20. VERTICILLIUM WILT	104
21. ORGANS OF A CHRYSANTHEMUM FLOWER	116

INTRODUCTION

THIS, my third book on Chrysanthemums, has been undertaken with very great pleasure, and it is hoped that the same amount of benefit will be experienced by those who read it. I am always happy to write upon the many phases of chrysanthemum topics, and to try and disseminate what knowledge I have for the benefit of those who wish to learn, for all of us can keep adding to our experience, both in practice and theory. My work as a raiser of new varieties has given me much interest, particularly to see one's endeavours coming to fruition in the many improvements in all the types, resulting as it has done by the many new introductions sent out each year by my firm, H. Woolman Ltd., of Shirley, Birmingham. My firm has since its inception in 1881 despatched many millions of young plants to all parts of the world. Duties in judging and lecturing to many societies during the autumn and winter months is another pleasurable duty. My membership of the floral committee of the Royal Horticultural Society, in addition to being a life member, is an honour which is greatly appreciated by me. It has been my endeavour to give in this book practical and straightforward approaches to the various methods of culture and I hope and believe that it will be understood by all who read it.

JOHN WOOLMAN.

Shirley, Birmingham, 1956.

1

HISTORY OF THE CHRYSANTHEMUM

THE Chrysanthemum was first recorded in China in 500 B.C. and it was recorded in Japan in A.D. 386. The Japanese hailed it as their national flower in A.D. 797. The flower became the crest of the Mikado and its design was added to all important state documents. The Japanese as a nation valued the chrysanthemum greatly and brought expert cultivation to bear upon it. They became adept in the art of growing specimen plants, an art in which they are still supreme.

National festival days were commenced in A.D. 889 and continued for fifty years in honour of the chrysanthemum. In 1764 the flower was first introduced to England, but it was not until 1790 that successful culture was commenced, although it was cultivated in France by M. Louis Pierre Blanchard in 1789. Importations were made into England from Japan and China from 1820 to 1826, with the result that quite a good number of varieties could be grown. All these importations were of one type: a small incurved flower.

The first Englishman to raise seedlings by cross-fertilization was Mr. Wheeler of Oxford. In 1838 Mr. John Salter raised a greatly improved incurve, which was larger and of finer quality than the existing imported ones, and thus the first large exhibition incurve was an accomplished fact. This variety was named Queen of England. In due course it gave a primrose sport which was named Empress of India; thus the existence of two varieties of large incurves paved the way for the existence of so many beautiful incurves seen at our exhibitions today. In 1861 Mr.

Robert Fortune raised seedlings among which were not only incurved flowers but those with reflexed petals. From these we were able to produce other reflexed varieties not only of the medium type but of the large exhibition, or Japs as they were known, to grace our exhibitions up and down the country. The reflexed type gave a great uplift to commercial growers and from then onwards large quantities were grown for the markets as cut flowers. There were a number of fine raisers in Europe, and in France particularly, towards the end of the nineteenth century. During this century raisers in England have played a very great part in the improvement of the flower in all its types. The improvement in the early flowering varieties alone, brought about by English raisers, has been immense, not only in size but in petal formation, hardness of petal and lasting qualities. Colour tones, too, have been greatly improved and, as a raiser, one wonders if the improvement of the past can be continued into the future. I have heard it said by some growers that the old varieties are best, but remember the old varieties were once new.

2

RETARDING OR ACCELERATING FLOWERING PERIODS

IT is well known that chrysanthemum flowering is governed largely by length of daylight, or if you like, darkness. As a short-day plant, it naturally flowers in the autumn and winter. It can, by artificial means, be made to flower in almost any month of the year but it may not be generally known, however, what a great part temperatures play in this scheme. I have carried out many experiments in this respect and possess much data on the question. Therefore, it will be interesting to give general notes to my readers upon my findings. The first important phase is that of vernalization when in the early stages of growth, and it is proved that bud control is greatly assisted when the young cuttings are vernalized; that is, subjected to a temperature just above freezing-point for three to four weeks. This does not mean that the low temperature need be maintained the whole time; it is sufficient that night temperature is applied.

It will be seen that plants having had this treatment can by lighting treatment be made to flower very much more quickly than plants which have been kept in a higher temperature. It is also known that, by subjecting plants to high temperatures and long hours of light, flowering can be prevented entirely. This light treatment, photo-periodism, as it is termed, is practised on a considerable scale in the U.S.A., and consequently chrysanthemum flowers are sent to the markets most months of the year. They are said to find a ready sale, but whether the same demand would be found in this country is open to question. It would be impossible to give all details of experiments conducted over the years, but

should any reader wish to delve further into the intricacies of the matter, he or she could procure W. W. Schwabe's writings in the *Journal of Experimental Botany* of 1950-1.

Here is a brief catalogue of action in order to accelerate bud formation. Plants are grown in the ordinary way, and during the early part of July darkening is given from about 5 p.m. to 8 a.m. next morning. Thus plants are subjected to fifteen hours' darkness and it is surprising how soon buds are formed. Darkening in July will bring normal November varieties into flower in September. To induce flowering in other months, darkening is put into practice accordingly.

Although the details given in this chapter are mostly of scientific interest, they nevertheless are of great use to raisers of new varieties, inasmuch as two varieties flowering at a different time of the year can by photo-periodism be crossed together and, therefore, varieties can be introduced which would otherwise be impossible of achievement. Darkness can be obtained by covering with material of suitable thickness or texture in order to exclude light. It would be necessary to construct a framework round the plants, so that the covering material may be conveniently fastened to it. Some growers use deep brick frames, which can be easily covered over the top.

3

NEW JAPANESE FANTASIES AND OTHER TYPES IN JAPAN

THIS new race of chrysanthemums has not as yet appeared before the public in England. It is a race of very fine quill-petalled varieties of varying shapes. It so happened that I possessed a book by a Japanese author wherein is fully described these fantastic chrysanthemums, accompanied also by coloured plates. These weird pictures made such an impression on my mind that I decided to import some if at all possible. But how? I had no grower's address, and I wondered if I could somehow contact someone who would be flying over there who would be kind and sympathetic enough to bring back some plants. Alas! that did not work out, and so I had to give up the idea. Later, however, a miracle occurred and it happened in this way. At our local Rotary Club an International Correspondence Scheme was inaugurated whereby each member was given an address of a Rotarian in a foreign country, to whom he should write. In due course, a reply was received in answer to my letter to Japan; not only was it an answer, but lo and behold! my friend was a chrysanthemum specialist. What more could I wish for, for here my prayer had been answered, and I promptly asked that some varieties of these "Fantasies" be sent to me, and that I would in return send some large exhibition varieties of my own raising.

In due course about eight or nine varieties arrived, two or three stools of each. They mostly survived and were in good time to grow on in the summer of 1955, and so in that year all were flowered. It is my intention to grow a batch of them in the summer of 1956 and exhibit them in the autumn of that year.

Now as to the types. All are quilled varieties of the Rayonante order, but much more dainty and pretty. The ordinary quills are of three categories—viz., medium quill, thin quill, and finest of all, needle quill, having petals not much thicker than a piece of cotton. In all these quill varieties there are about 300 petals in a well-grown flower, each petal 12–15 inches long, and most varieties having a ringlet or curl at the base of each petal. The flowers are opened over a wire ring, thus a very pretty and delicate flower is formed.

The next type I would like to describe are what may be termed straight quills; that is to say, the quill petals protrude 4 or 5 inches, straight out from the calyx, resembling a paint brush. I have never seen anything like this before, but the effect is quite unusual. I predict a great interest in these varieties when they are put before the public and the ladies in particular will take them to heart.

There is a good range of colours in all these types, and some of the descriptions as to naming are as weird as the flowers. Here are some instances: *Teito-no-koe*, meaning "The Voice of the Metropolis," a yellow thin quill; *Shiko-Seo* (Purple Star), *Echigo fishi* (Lion's Mask of the Tree Tumbler), colour rose; *Yusen* (Secluded Spring), colour white; *Shishi-Gashira* (The Lion's Mane), colour red; *Kozo* (the name of an unhappy maid of honour in medieval Japan), this one a straight or brush quill. I hope we in England will not have to print all those particulars of nomenclature.

As far as I can yet see, the cultivation will be much the same as, say, our ordinary decoratives or singles, with, according to their book, two or three stoppings. Another type with which this book deals is the dwarf chrysanthemum, which seems totally different to ours. The growth seems hard-branching and woody, more like an azalea. They appear most unique and if I can procure some of these I would certainly like to try them, to find out how they fare in this country. Another type once grown over here is the hairy chrysanthemum, and I well remember two varieties, Hairy Wonder and Louis Bohemer, of forty years ago. The Japanese

growers still have a number in cultivation and a beautiful pink called *Fummo-giker* (Powdery Hair) is pictured in colour.

This most fascinating book also deals with edible chrysanthemums, and a few excerpts on this matter will, I think, not be out of place. Their earliest use may be traced to China, where they are supposed to be much prized as Elixir Vitæ as early as 770 B.C. They were used at the festival Chrysanthemum Banquet early in this present century. The flower petals of edible chrysanthemums can be eaten without distinction of their colours and excel in flavour and sweetness over other species. In the Nara epoch (710-84), and in the Heian epoch, many books also recorded their medicinal use.

In conclusion, it is clear that both China and Japan are rich in chrysanthemum lore. The more we probe into the intricacies of our eastern friends' knowledge of chrysanthemums the more humble we become. Yes, we still have a great deal to learn.

4

CHRYSANTHEMUM STOPPING AND TIMING

IT is sometimes a great mystery to the uninitiated why stopping is needed, but if the grower understands the reasons for this operation, then the whole matter is simple.

There are three main reasons why this is resorted to. Firstly, to reduce the number of petals in a flower; secondly, to increase the crop; and thirdly, to allow a flower to finish perfectly.

The broad outline as regards large exhibition flowers is as follows. In the first crown, petals may number anything from 500 to 1,500, and often those varieties with the larger number have far too many central petals for the flower to finish perfectly and therefore these would not be considered good flowers. The difference between a first and second crown bud is a reduction of petals of between 100 and 300. Therefore, if a flower carries 1,500 petals on a first crown and does not finish its centre formation, then that variety needs a second crown so that the fewer petals are able to finish correctly. The reduction in petals, if a third or terminal crown is used, which it seldom is, would more often than not result in a flower with an open or single centre, and so it is seen that petal reduction is carried too far in that case.

Another reason for stopping or pinching is to bring a flower to perfection around a given date. There would always occur what is known as a natural break, which means that a bud is formed on the single stem of a young plant, and from that break bud side laterals will grow. The first bud that forms on these laterals after the break bud, is called the first crown. If that is taken out, the next bud that forms is the second crown (see Stopping and Timing Fig. 1).

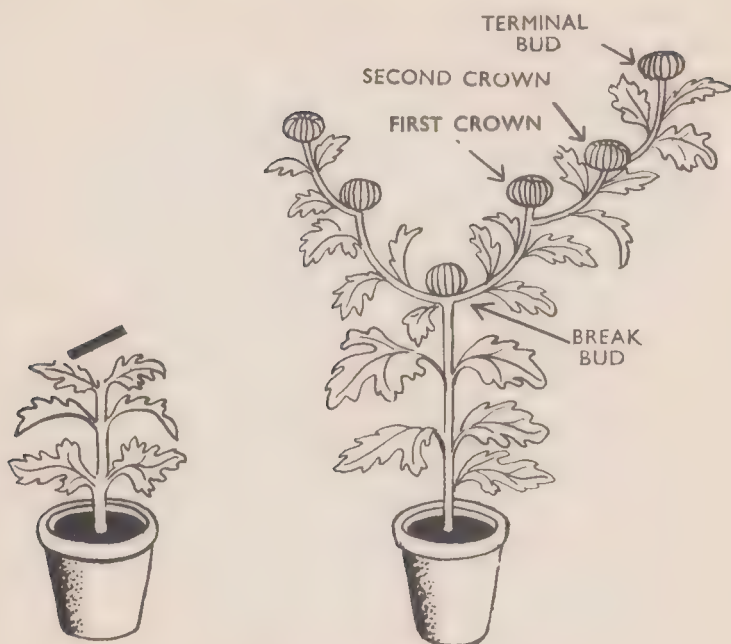


FIG. 1. STOPPING KEY

By means of stopping, flowers are timed; for instance if a natural break first crown gives flowers too late on a certain variety, then the plant is stopped before the break bud appears and so the resulting laterals and first crown bud appears earlier. Stopping is often resorted to in order to increase the crop, by which the number of laterals are added. This is so in the case of specimen plants and decorative kinds which are required to produce quantity in preference to size. It will be noted that all reputable specialists give the correct stopping and crown bud in their catalogues, often by means of a stopping key related to a letter which is denoted in the description of each variety. When a new variety is introduced by a raiser, the correct stopping and timing has been deter-

mined during the trial period preceding its introduction. It will be seen that this question is thoroughly advised, so that the amateur grower need no longer be puzzled as to its application.

There are certain types which are governed principally by their own time of flowering—viz., November decoratives are usually first crowns, whereas December or Christmas varieties are generally on second crowns. Even though the specialist has given every advice regarding stopping it is always well for the amateur to keep his own notes as to which stopping is best for his particular district.

STOPPING OF EARLY FLOWERING VARIETIES

The methods of stopping these are somewhat different to that of indoor pot varieties, for there are very few earlies that require second crowns. Earlies should be allowed to break naturally and stopping of these consists only of pinching out the centre bud after the natural break has happened. In this way strong, quick growing laterals will result, which will provide first crown flowers in good time.

It may be well to explain differences in varieties which are divided into two categories—viz., long break and short break types. Some varieties will not break until the main stem has grown

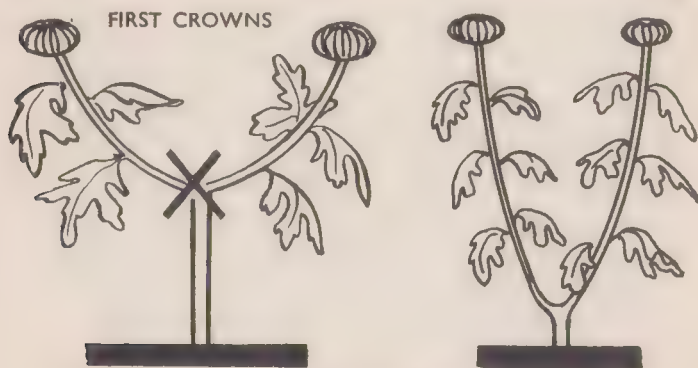


FIG. 2. LONG AND SHORT BREAK EARLIES

to approximately 2 feet. These are termed long break varieties; the short break kinds may break when the stem is but 6 inches high and may even do so at ground level. In each case if the cuttings are rooted at a reasonable time, say February or March, good flowers will be obtainable in August or September. It is well to point out that colour is more intense when flowers are later. In other words, a bronze or first crown often becomes quite red on second crown. This applies mostly to indoor varieties.

It is hoped that the foregoing remarks will help to smooth out some of the supposed intricacies of stopping and timing so often puzzling to the amateur grower.



PLATE I
PLANT POTTED



PLATE II
BUD TAKEN



PLATE III (*above*)
PLANT BEING STOPPED

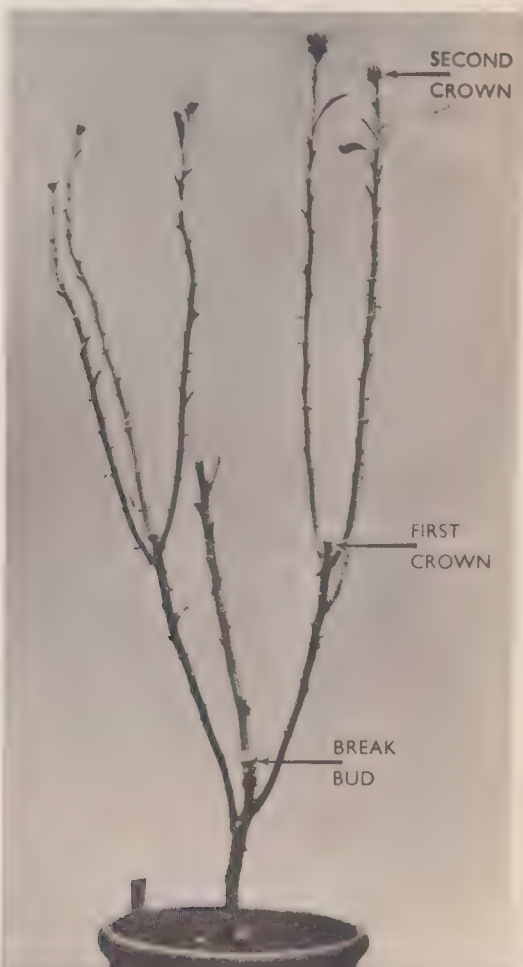


PLATE IV
SHOWING DEVELOPMENT OF
PLANT AFTER STOPPING

5

THE PROPAGATION OF CHRYSANTHEMUMS

CUTTINGS

IT is well known that chrysanthemums, on the whole, are easy of propagation, nevertheless there are some golden rules which can be followed in order to make sure of a good strike.

First of all, selection of suitable cuttings is important and an immature or overgrown cutting should be avoided, as should one which has a hollow or pithy stem. What is required is a cutting of good texture, with short joints and small foliage. They should



FIG. 3. GOOD AND BAD CUTTINGS



FIG. 4. TRIMMING THE CUTTING UNDER JOINT

usually be taken from the base of the plant, except in the case of a variety which only throws cuttings up the stem, and those may be used with confidence. The same rule applies in the case of a variety which mostly makes bud cuttings. Use them by all means, they will root and the bud will become immobilized and a strong shoot will grow away. Cuttings should be from 2 to 3 inches long, and to prepare them for insertion cut closely under a joint and remove the lower pairs of leaves.

COMPOST

The compost for rooting should consist of six parts of riddled loam, one part of fine leaf and one part of red ash. The latter makes a fine rooting medium. The grower, according to the means at his disposal, may use pots or boxes to contain the cuttings, or if

large quantities are required he follows the commercial grower and makes up beds on the greenhouse stages. Pots should be clean and the crocks also must be sterilized by boiling for twenty minutes. Fill in some rough riddlings on the crocks, or if boxes are used, riddlings also will suffice. Fill in the compost up to half an inch from the top of the pot or box and spread a layer of clean, sharp sand on the surface.

INSERTING THE CUTTINGS

Take the cuttings which have already been trimmed and insert them with the aid of the blunt end of a pencil. This will take down enough sand for the base of the cutting to rest upon. Never insert them deeply; half an inch is ample. It is better to insert them closely, say about 1 or 1½ inches apart. When the pot or box is finished give a good watering with a fine-rosed can and place on a bed of ashes on the greenhouse stage. A temperature of 45–50° F. is ideal. The grower should aim to maintain moist conditions in the surrounding area such as floors and staging of the greenhouse. Many amateurs have not at their command a propagating house and are forced to root the cuttings in a less close greenhouse, in which contingency it is well to enclose the pots or boxes in a case which can be covered with glass, in order to maintain an atmosphere. When this method is adopted, place an inch of fine ashes on the base of the container so that a moisture can be obtained by damping the ashes periodically.

COVERING THE CUTTINGS

The aim of the propagator is to see that the cuttings do not flag unduly, for if they can be kept upright and turgid they will root more quickly. It is, therefore, well to protect with sheets of newspaper if flagging takes place, especially during sunlight or drying winds. The papers can be removed when the cuttings have again taken an upright condition.



PLATE V

CUTTING, TRIMMED AND
UNTRIMMED. NOTE LOWER
LEAVES ARE REMOVED

PLATE VI

ROOTED CUTTING
READY FOR POTTING INTO
3½-INCH POTS



DATES FOR INSERTION

In the case of the large exhibition varieties, which require a long season of growth, cuttings should be put in during December, January or early February to produce two flowers per plant. Later insertions all through March may be made when only one flower per plant is grown. In the case of November and December flowering decoratives, singles, and other types such as anemones and pompoms, March is a very good month, but rooting can take place during April. Again, for the early flowering varieties March is the usual period, as this type grows away quickly from cuttings. At this time the rooting period is usually about three weeks. The grower will easily know when a batch of cuttings becomes rooted by the fresh green appearance in the centre of the plants. It is imperative that they should then be potted up and not left to produce long roots which may be damaged in the process of moving.

HORMONES

Various preparations are advertised to assist in the production of roots, but if the conditions are right and the cuttings good, these will not be required. If, however, a grower finds a particular variety very difficult, then a rooting aid may be used.

VARIOUS NOTES

Included under this heading are various *do's* and *don'ts*. *Don't* let cuttings get too long or thinly drawn before using. Keep stock stools, which have been cut down, in a light, airy position. Watch for insect pests on cuttings to be inserted. Dip all cuttings in a nicotine solution before planting. Label all cuttings correctly as they are taken from the old stock. Cuttings pulled up with a root are inferior to freshly rooted cuttings. Do not sever a cutting from low down under the soil, wait until it can be taken off at soil level. Discard all thick stem cuttings and those with large foliage. Fumigate or spray with insecticide, previous to taking a batch of

cuttings from stools. Keep an even moisture in the soil in beds of cuttings. Nip off any leaves which may have damped whilst rooting. Reduce the temperature when cuttings are known to be rooted; 35-40° F. is ideal.

Very little trouble will be experienced if these details are adhered to.

6

SOILS, COMPOSTS AND FERTILIZERS

IT is very important that some knowledge can be brought to bear upon the above subject, for much depends upon the quality, texture and feeding elements contained in the mixture. It is said that soil is made and not born; a statement which means that pastures which are treated with good husbandry, well fed, well grazed, and well supplied with manurial elements both organic and inorganic, give best returns. The texture of turf needed for good cultivation of chrysanthemums is that which measures up to the above schedule, plus that it is of what is called a medium heavy nature. We of course know that soil is a living thing, containing bacterial organisms among other mineral elements. Its composition of sand, silt and clay is enhanced by varying decomposition of dead and decaying plant material, which is always being returned to the surface of the earth.

It is from this never-ending process that the chief source of the Nitrogen element is supplied. It will be patent, I think, to anyone that pastures well looked after will form the better base for chrysanthemum potting compost, than those which are deficient in organic and inorganic fertilizers. Some people think that ordinary garden soil will suffice, but the great deficiency in such is that of fibre or plant roots. Good fibre is essential to give buoyancy to the compost, allowing as it does proper aeration, especially in the case of chrysanthemums which have to be potted firmly. Turf which has a gravel subsoil, or even medium clay, is usually ideal. It should be made up of round particles which bind the whole together, rather than powdery sheddings. Here is a test. Hold up a piece of turf high in the air and drop it on to the ground. If it

sheds a lot of fine powdery soil it is not good, if on the other hand very little shedding takes place, and that which does is of round knobby pieces, that denotes good turf. Don't be misled by unapproved suppliers.

STACKING THE TURVES

Neat stacks should be made in a square shape, with the larger turves on the outside. Build in bonded fashion as in a brick wall. Time of stacking is usually September–October, to be ready for use in the following spring and summer for the various shifts mentioned elsewhere. I am not a believer in keeping turf more than twelve months, owing to fibre deterioration. The thickness which the turf is cut from the field depends greatly upon the richness and fertility of the pasture. Six to eight inches is usual. From a pasture which is known to be not so old, 3–4 inches would be preferable when making the stack. If the turves are dry, a good watering should be given to each layer as the work proceeds. The height of the completed stack should not be more than 4 feet, or the various organisms and bacteria will be much reduced. Do not add layers of manure when stacking; this is better added to make a perfect balance when the compost is made up for potting. The lime content, however, may be checked at the time of stacking; the pH content is important, the neutral value being pH 7. Anything below that value will benefit by having a sprinkling of lime added in alternate layers of turves. An efficient lime-testing apparatus can be purchased from various drug houses. Lime does perform the function of absorbing waste acids and of speeding up available plant food. If an open shed or barn is not available the stack can be made in the open, but means should be available for protecting it from heavy rains in winter.

ESSENTIAL ELEMENTS

Nitrogen makes for green growth and leaf formation: is quick acting.

C

FORMS OF NITROGEN

Nitrate of Soda. Very quick acting; readily soluble, its effect is almost immediate.

Sulphate of Ammonia. A quick-acting nitrogen, but a little slower than nitrate of soda.

Dried Blood. Very heavy inorganic nitrogen, fairly rapidly absorbed.

Hoof and Horn. Slower in action; useful for potting mixtures.

Soot. Very safe form of nitrogen if used sparingly.

Nitrogenous fertilizers must be used sparingly for chrysanthemums.

Potassium. Controls quality of growth. Of great value in correcting disease; said also to assist in prevention of virus in the plant. Gives a steady, ripe and healthy growth. Improves the general colour and freshness of the bloom.

Sulphate of Potash. A form of potash most used in chrysanthemum cultivation.

Nitrate of Potash. A very concentrated form, must be used sparingly.

Phosphorus. Promotes root formation, an agent in the ripening maturity of the plant.

Superphosphate is the universal source of phosphates.

Bone Meal and Bone Flour supply good organic phosphates: slow in action.

Lime prevents the waste of phosphates, and makes available the humus in the soil; assists in the solubility of the trace elements such as iron, boron and magnesium, which are usually present in sufficient quantity in most soils.

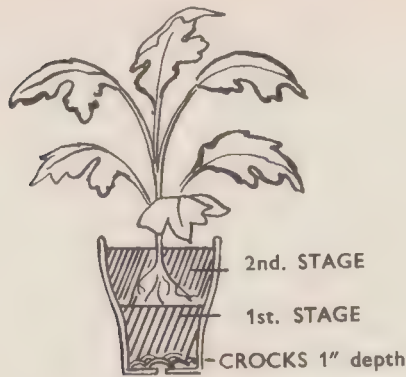
Unless he has a good knowledge of horticultural chemistry, the amateur grower is advised to procure well-known brands of chrysanthemum fertilizer, rather than mix the ingredients named in this chapter. This special fertilizer contains all the chemical elements required and is mixed with a knowledge of the plant's need. It is often made to the formula of an expert grower.

CULTIVATION OF LARGE EXHIBITION CHRYSANTHEMUMS

AT one time this type was known as Japanese, but as practically all varieties now in commerce have been raised in England and a few in Australia, it was thought that the term "large exhibitions" should be preferred, but even so, many growers still refer to them by the old name. There is a sub-section called "medium exhibitions" with flowers not quite so large and in some shows separate classes are made for these. A selection of suitable varieties for each section is given at the end of this chapter.

Cultivation of the large types is an exacting and painstaking procedure, especially if the grower intends to show his flowers. Propagation of cuttings should be carried out or commenced earlier than many other sections, but the exact dates depend very much upon the variety. For instance, where a variety takes a long time to mature or is slow to develop, particularly in the bud stage, then that variety must have an early start. In these cases cuttings should be inserted in November, whereas a faster-developing variety may be inserted in January to February. The good grower gains by experience, and judicious notes are made as to the best times for the varieties he intends to grow. Methods of propagation are dealt with in Chapter 5.

Cultivation from the rooted cutting stage is therefore dealt with here. The young rooted cutting is first potted into a 3½ inch pot; compost as follows: Six parts riddled loam (fibrous turf); half a part stable manure, one part leaf—oak or beech—freshly gathered from the previous autumn; one part red ash (this material is supplied by contractors who use it to surface tennis courts).

FIG. 5. $3\frac{1}{2}$ -INCH POT

To the whole must be added a $3\frac{1}{2}$ -inch pot of slaked lime to each cwt. The mixture should be made up two to three weeks before using so that it becomes properly incorporated. The pots should be washed or boiled, so that they do not carry disease germs or fungus spores.

METHOD OF POTTING

Each pot must be crocked, a larger crock over the hole and smaller ones on top. Make up to about an inch depth. Gather the roughest portions of the soil and fill up to half the depth of the pot. Make this base firm. The rooted cutting is then held on this and the rest of the soil placed around up to pot level, which, when pressed down, leaves an inch of space at the top. All pottings of chrysanthemums should be firm and solid.

The newly potted plants should be stood on an ash base on the greenhouse stage, with a temperature of 40–45° F. Never water a newly potted plant, but let it stay until the soil, which should be moist when using, dries out, and then fill up the space allowed for that purpose. For subsequent waterings, always tap the pots with a blunt piece of wood, and water all those which give a hollow ringing sound. Watering is a skilled job and many plants

are ruined through bad watering, especially in the young stage. The temperature should never be high. The chrysanthemum being a cool plant requires a steady growth and even at this stage 40° F. is plenty. Give the young potted plants enough air space between each one and always keep the lights of the greenhouse open on all favourable occasions.

In about four weeks the plants will be ready for the second shift—viz., a 6-inch pot. As before, see that the pots and crocks are clean and ready for use. Compost for this should be six parts finely chopped loam (not riddled), one part stable manure, one part red ash, one part leaf or peat. Add to this, 1 lb. of a good chrysanthemum fertilizer, and $\frac{1}{2}$ -lb. of bone meal or hoof and horn to each cwt., with a $3\frac{1}{2}$ -inch pot of slaked lime to each cwt. This is the complete mixture for the second shift.

Now for the potting operation. Crock the pots as before and fill one-third of the pot depth with the roughest of your compost;

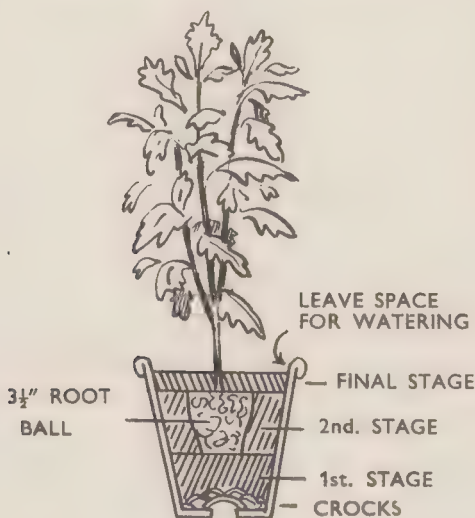


FIG. 6. 6-INCH POT



POTTING STICK



TAPPING HAMMER

FIG. 7.

this must be rammed down firmly. Next knock out from the $3\frac{1}{2}$ -inch pot, taking care to see that these have previously been watered. Pots knocked out when dry will result in many new white roots being destroyed by clinging to the side of the pot. Never pot on a plant which is not well rooted round, neither should you allow plants to get pot-bound. If a plant does not have its roots nicely round the pot, leave the operation until later. Upon the base soil, the ball from the $3\frac{1}{2}$ -inch size is inserted after carefully removing the crocks. Then fill up another third of the depth and ram firmly round and finally fill the remainder and ram down so as to leave an inch of space at the top for watering. Plants newly potted into 6-inch pots need only be kept in the greenhouse in a cool temperature for about fourteen days and should then be transferred to a cold frame. Water with care by tapping with a wooden hammer to see which rings dry. Fill the inch of space with water. A potting stick for chrysanthemums should have a wedge end and a blunt end and the length should be about 12 or 15 inches. See Fig. 7. When plants are in the cold frame, careful watering is necessary and also protection from frost at night. Should a period of cold night frosts occur, say, in March, ample protection can be given by placing newspaper over the plants under the glass and putting a mat over the lights. In mild

weather, however, the lights may be removed in the day time, the aim being to promote short-jointed steady growth. As soon as the frosts are finished, about the end of April, the frame lights may be dispensed with altogether.

The time will come when plants must go into a final pot from mid-May onwards and here is the final compost: Six parts chopped loam, chopped about 2 inches square; one part leaves. Use whole, just as gathered in the autumn, but do not put them through a riddle. Peat may be used as a substitute, but oak or beech leaves have preference always; one part stable manure, not too old, $1\frac{1}{2}$ lb. chrysanthemum fertilizer, 1 lb. bone meal or hoof and horn and a $3\frac{1}{2}$ -inch potful of slaked lime to each cwt. of compost. The size of pot for final potting should be $8\frac{1}{2}$ or 9 inches. As for the 6-inch size, crock the pots to about 1 inch in the base and ram the compost firmly to one-third of the depth of the pot.

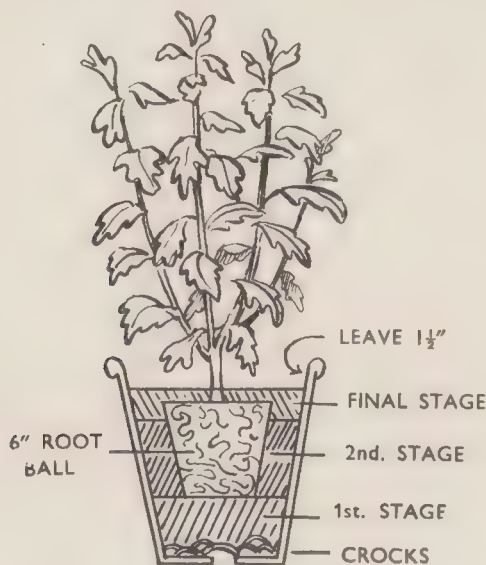


FIG. 8. $8\frac{1}{2}$ -INCH POT

Knock out from the 6-inch pot, remove crocks and place upon the rammed base. Fill up another third around the ball of soil and ram firmly down, finishing the last portion, firm down to within 2 inches of the top. When completed, stand the plants in an open situation, on slates, tiles or ashes. Do not try to protect them behind a hedge or wall. Give them the most open space you have, and if possible stand in single rows with a 2-foot space between each row. These plants need all the air and sunlight possible. Pay strict attention to watering only those that require it.

The next operation is to support the rows with a post at each end of the row, and each cane should be tied to a wire held taut by the posts, a sure prevention of damage when high winds occur.

As the plants proceed, an extra feeding is required from early June. The best method is by top-dressing every three weeks with 10 lb. chrysanthemum fertilizer to 1 cwt. of riddled loam. Each plant is given a good handful which will spread evenly over the pot. Always water with a good straight rose on your can, this will prevent the top dressing being washed overboard. The last dressing can be given just after the plants are housed.

Plants must always be kept free from insect pests and fungoid disease, and Chapter 21 explains the methods of treatment. Stopping and timing, also bud taking, is important too, and is dealt with in Chapter 4.

The next major operation is housing, and the time for this for the large exhibition kinds is about September 20 onwards. First see that your greenhouse is well washed down and made clean for the reception of the plants. House them according to heights so that you may see every plant, but do not crowd. The foliage of the plants should not touch each other. When all plants are indoors see that all vents and air spaces are open. The temperature can rise very high even in October. As the weather cools and the nights become damp or foggy, then a little fire heat will become necessary, but always leave a small space open in the roof vents, so that a good air circulation can be obtained.

Two operations should be carried out during the first week of housing. First, a fumigation with a known preparation, for control of Aphis and a sulphur vaporizing for mildew control with the Campbell apparatus. This ends all mildew trouble for the whole winter. When artificial heat is given, do not create a high tempera-



FIG. 9. CAMPBELL'S SULPHUR VAPORIZER

ture; an oil heater is quite sufficient in a small greenhouse. There are very efficient oil heaters nowadays which burn a blue flame and which are very reliable. The only warmth required is to keep the air dry and in good circulation. The time always arrives when the flowers open, and the attention to detail and correct procedure

will result in first-class flowers, those which are fit to grace the exhibition table and set up a tingling of pride in the grower's eye. I may say that when cuttings are rooted at the correct or orthodox time, two flowers per plant is the rule. If cuttings are rooted rather late, then one flower. Diagrams on page 29 will show you how these are obtained. There is always a sense of achievement in growing something of superfine beauty, whether for exhibition or otherwise.

SELECTION OF LARGE EXHIBITION VARIETIES

Amethyst, <i>Amethyst rose</i>	Yellow Duke, <i>pale yellow</i>
Charles Woolman, <i>rosy bronze</i>	Bertram Jones, <i>amber and gold</i>
Limelight, <i>lime yellow</i>	E. C. Swire, <i>rose pink</i>
Yellow Dennis Wroe, <i>yellow</i>	Shirley Champion, <i>deep yellow</i>
Dennis Wroe, <i>white</i>	Golden Habgood, <i>golden yellow</i>
Edith Woolman, <i>pink</i>	Shirley Primrose, <i>primrose yellow</i>
Duke of Kent, <i>white</i>	Shirley Desire, <i>ivory, pink outer petals</i>
Bert Webb, <i>deep yellow</i>	Yellow Jessie Habgood, <i>yellow</i>
Betty Barnes, <i>maize yellow</i>	Salmon Patsy Robinson, <i>salmon bronze</i>
Jessie Habgood, <i>purest white</i>	Harold Habgood, <i>yellow</i>
Majestic, <i>golden amber</i>	Elizabeth Edney, <i>white</i>
Patsy Robinson, <i>pearl pink</i>	Shirley Superb, <i>rosy purple</i>
Maurice White, <i>chestnut</i>	Leviathan, <i>chestnut</i>
Harry Lees, <i>chestnut red</i>	
Cossack, <i>crimson</i>	
Pocketts Maroon, <i>crimson</i>	
Portsmouth Champion, <i>apricot bronze</i>	



PLATE VII READY FOR BUD TAKING: REMOVE SIDE LATERALS

PLATE VIII TOP DRESSING WITH CHRYSANTHEMUM FERTILIZER



PLATE IX

LATERALS GROWING FROM
BREAK BUD



PLATE X

GOLDEN CURRY---
INCURVED VARIETY SUITABLE
FOR GROWING AS
SPECIMEN PLANTS





PLATE XI SHIRLEY LAVENDER—NEW LARGE EXHIBITION
INCURVING VARIETY

PLATE XII SUEZ—NEW LARGE EXHIBITION REFLEXED VARIETY



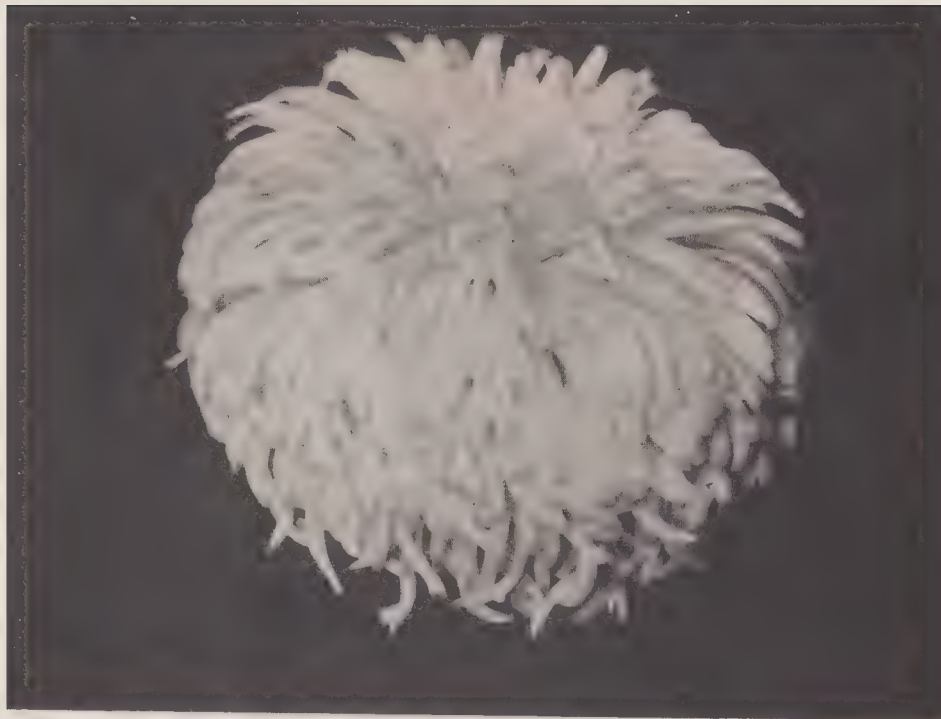


PLATE XIII FAR NORTH—FINE NEW REFLEXED DECORATIVE
FOR NOVEMBER

PLATE XIV PINK JAP—LARGE EXHIBITION



8

ANEMONE-CENTRED CHRYSANTHEMUMS FOR INDOOR FLOWERING

THE anemone type is largely a product of the U.S.A. and the Continent of Europe. They comprise large-flowered and medium-flowered. Their cushioned or honeycomb centres make them most handsome for flower decorations. Cultivation is as for the single and decorative types, except that stopping and disbudding can be dispensed with. Cuttings rooted in February or March are suitable for flowering in 7- or 8-inch pots to flower in November. Pot into $3\frac{1}{2}$ -inch pots and from those into the larger flowering pots.

SELECTION OF VARIETIES

Alice Searle, <i>bronze</i>	Nevada, <i>white</i>
Beautiful Lady, <i>pink</i>	Pheda, <i>cerise and gold</i>
Bronze Frieda, <i>bronze</i>	R. Mounsly, <i>bronze</i>
Denebola, <i>lilac</i>	Scarlet Pimpernel, <i>light crimson</i>
Frieda, <i>deep pink</i>	White Frieda, <i>white</i>
Graceland, <i>lemon and white</i>	Yellow Rolinda, <i>amber yellow</i>
M. Stacy, <i>old rose</i>	



PLATE XV

CONNIE MAYHEW (INCURVED)

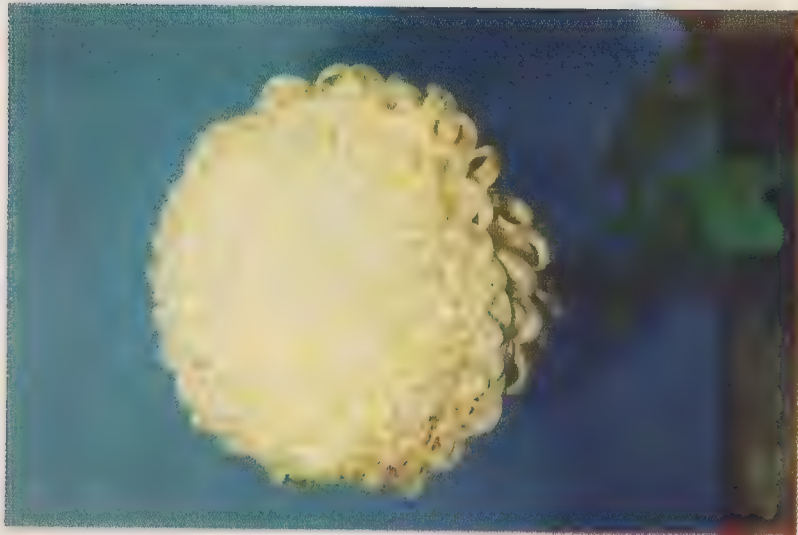


PLATE XVI

LIMELIGHT (JAPANESE)



PLATE XVII

SALMON KENT (JAPANESE)

YELLOW DENNIS WROE (JAPANESE)



PLATE XVIII

BARCAROLLE (INCURVED)

FREDA WILSON (JAPANESE)

PLATE XIX

PLANT IN 6-INCH SIZE
STOPPED, AND BREAKS
GROWING AWAY



PLATE XX

LONG ISLAND BEAUTY—INDOOR
ANEMONE VARIETY



9

POMPONE CHRYSANTHEMUMS, NOVEMBER FLOWERING

AGAIN, as in the anemone type, the pompones need not be stopped or disbudded. The time of insertion of cuttings and size of pots is as for the anemone type. The flowers are most handsome for indoor decoration; their slender flower stems making them ideal for this purpose.

SELECTION OF VARIETIES

Baby, <i>small yellow</i>	New York, <i>golden bronze</i>
Dainty Maid, <i>pale pink</i>	Nugget, <i>yellow</i>
Dresden China, <i>shell pink</i>	Ethel, <i>reddish bronze</i>
Iridescent, <i>pale pink</i>	Mlle E. Dordan, <i>pink</i>

10

IDEAS ON POTTING AND WATERING

THIS very important chapter is often omitted from books and publications on chrysanthemums, but there are so many rights and wrongs and do's and don'ts that any work is incomplete without such a chapter.

It is without contradiction that plants grown in pots produce the better flowers and if grown for exhibition, pots must be used. There are other methods, which many market growers employ, but market flowers are not just like exhibition blooms.

FIRST POTTING

Rooted cuttings taken from the propagating frame are potted into 3½-inch pots which must be made clean by washing or boiling. Many disease germs can lurk in pots which have been stored for fairly long periods. Crocks also should be given the same cleansing. Carefully dig up the rooted cutting and fill the 3½-inch pot after crocking to half its depth, make this base firm and hold the rooted cutting upon this, then fill up around the plant and press down firmly with the thumbs. Leave half an inch of space at the top. Types of compost are given in Chapter 6 for each size pot. Stand the plants in a moderately warm greenhouse for a few days, after which plenty of air and cool conditions must be the rule. Protection from frost is all that is required. Don't water freshly potted plants, but wait until they dry out. If plants flag, lightly spray with a fine rose for at least a week, after which the tapping hammer comes into operation and the dry ones are well watered.

SECOND SHIFT

This should be a 6-inch size. Follow the same rules as given for the $3\frac{1}{2}$ -inch size, except that the compost is rougher and the base is rammed firmly to about one-third the depth of pot. Turn out from the $3\frac{1}{2}$ -inch size and fit firmly on to the base. Add the compost round the sides and ram down with the thin end of the potting stick, leaving an inch of space for watering. Stand on an ash-covered stage and maintain cool conditions. Skill in watering is essential. A good water man is always a good grower, but it is fatal to over-water at any stage, and only when a hollow ring is indicated when tapped with the hammer is water needed. When the 6-inch pot plants have got a start, remove to a cold frame on an ash base. Cover with frame lights for a week or ten days, after which the lights may have air admitted on favourable occasions. Towards or about early May the lights may be dispensed with, providing seasonal weather is at hand. Watch for frost, however, and return the lights if necessary at night.

FINAL POTTING

About the first week in June the plants will be ready for final or $8\frac{1}{2}$ -inch pots. The methods and principal for potting are the same as given for the $6\frac{1}{2}$ -inch size. Pot firmly, using the blunt end of the rammer, and leave a space of $1\frac{1}{2}$ inches at the top. Stand the newly potted plants in an open situation on boards, slates, tiles or any material at hand to prevent worms entering. If you are growing the large exhibition type, two canes are used and inserted at the time of potting. Often a plant has been stopped while in the 6-inch pot and two strong laterals may be growing away. Each will require a cane. Fig. 10 shows this operation.

WATERING

Watering in the final pots must be carried out carefully. Never water a plant unless it is dry. The ringing sound from the tapping stick will tell you which to water, and which not to water. Fill

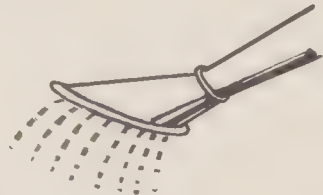


FIG. 10. METHOD OF STAKING IN FINAL POTS.

up to the top of the pot when watering the dry ones. Never water a freshly potted plant; correct any flagging with an overhead spray from a rose can.



STRAIGHT ROSE



FAN ROSE

FIG. 11

SUPPORTING THE ROWS OF PLANTS

When the final potting is complete the rows must be secured by wire attached to posts at each end of the row. Strong winds can do a lot of damage to well-grown plants during August and early September. Labour and results will be nullified if they are not properly tied and are allowed to be blown down. It is often found that even in rainy weather well-grown plants get little or no water to the pots. Be vigilant in such circumstances and still tap the pots. Never water a chrysanthemum with a straight



FIG. 12.

SUPPORTING A ROW OF PLANTS

spout. Always use a straight rose, otherwise top-dressing soil will be washed away and holes will be bored in the compost, resulting in roots being exposed. If possible, when standing final pots outdoors, stand them in single rows with $2\frac{1}{2}$ feet or 3 feet between each row. In this way all air and sunlight will get round the plants, and well-ripened wood capable of producing good flowers will result.

PLATE XXI

PLANT READY TO POT INTO
6-INCH FROM $3\frac{1}{2}$ -INCH SIZE



PLATE XXII
FINAL POT
CROCKED



PLATE XXIII

PLANT IN POSITION FOR
FINAL POTTING



PLATE XXIV

TAPPING AND WATERING

EARLY FLOWERING CHRYSANTHEMUMS

NEVER before in history, I feel certain, has any flower shown such improvement in such a short space of time, as has the early flowering chrysanthemum. The magnificent flowers one sees at exhibitions are really astonishing to the expert and amateur alike. This improvement is due of course to the fine work of our modern raisers. Both reflexed and incurved varieties compare most favourably with the best of the indoor kinds. Improvement in colour also is most noticeable. The shades and tones which are produced today have brought the flower into great favour. A very great advantage to the ordinary grower is that he can cultivate earlies without possessing a greenhouse, right from the cutting to the flower. He does, however, need a cold frame to store the stools after flowering and to retain them during the winter. During very cold spells, the stools in a cold frame can be protected by covering them with two or three thicknesses of newspaper, and mats or sacks on top of the frame light. This cover can stay put for many days without any harm to the stools, providing they are kept dry. In fact, stools in cold frames need only be watered when first planted in the autumn.

PROPAGATION without heat can be successfully accomplished by rooted offsets being pulled from the stools in March planted in the frame. Cuttings made in the orthodox way can also be rooted in a cold frame in a sandy compost, the only danger being from damping of the foliage. Should this occur, the damping foliage should be pulled off. On all favourable occasions air should be

given by opening a crack on the frame lights. These cuttings will root quite well and make sturdy plants in April. If a small amount of greenhouse heat is available, cuttings will, of course, root more quickly and the danger from damping is not so great as those rooting in a cold frame. It is a good plan to spread an inch of clean ashes on the floor of the frame and then to add the rooting medium to a thickness of about $2\frac{1}{2}$ inches, composed of riddled loam six parts, red ash one part. Make a firm bed and spread $\frac{1}{4}$ inch of sharp sand on the surface. Trim the cuttings and insert, not too deeply, say $\frac{1}{2}$ inch, and make firm. The only thing needed is to protect from frost with newspapers, and to guard against excess moisture. Cuttings under these cold conditions would take about four weeks to root. These when rooted will be ready to be transplanted about 4 inches apart in a compost containing a little feed.

Make up a bed as follows: six parts riddled loam, one part leaf of peat, one part stable manure, and 1 lb. of chrysanthemum fertilizer to each cwt. of compost. Make a bed about 4 inches deep, on top of an inch of ashes. When planting, make each plant firm, but do not water immediately. Far better to leave that operation for a few days and water on a favourable day. Subsequent waterings must be made only when weather is good. The plants will grow steadily and make good root systems ready for planting outdoors in the early part of May, for by that time one will be able to lift them with a good ball of soil.

PLANTING OUT is usually commenced at the end of April or early May, but previous to that, frame lights should have been removed for at least fourteen days in order to harden the plants.

PREPARATION OF SITE should be made by good digging in the autumn, and the addition of farmyard manure in each trench as the work proceeds. Should farmyard manure be unobtainable, any humus material, such as straw or leaves, may be used with a sprinkling of fish meal or bone meal. Lime content is also a

necessity and a dressing in March must be given if the lime content is low.

With the foregoing operations completed, all that will be required is a good forking and levelling of the soil in preparation for planting. Distance apart, as a general rule, should be 15 inches, but in the case of market culture, where large batches of one variety are grown, a small foliage kind may be planted 12 inches apart. Planting is best done with a trowel, making a hole deep enough to just cover the ball of soil. In other words, do not plant too deeply, and make each plant firm by slight treading.

STAKING. Where only a few plants of each variety are grown, canes are the most suitable means of support. These should be placed to each plant immediately the plants are put out and will prevent damage by weather. Usually 3-4 feet canes will be tall enough for most varieties. The commercial grower will require something more simple, so the wiring system is used. A stout post is erected at each corner of the bed and a movable strut is anchored across each pair of posts according to the number of rows of plants. A wire for each row is fastened to the strut at each end and made taut; if the beds are long, other posts and struts are

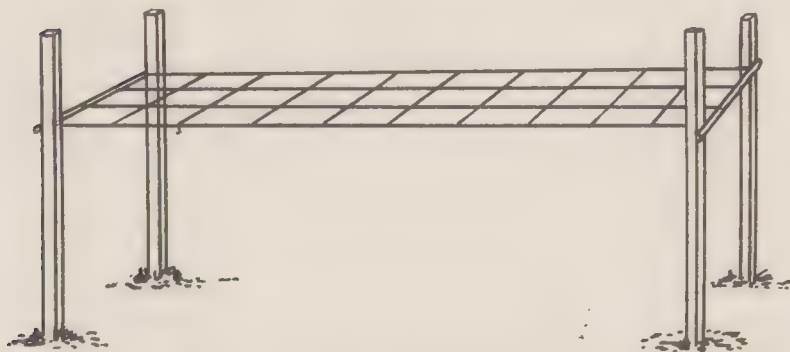


FIG. 13. POST AND WIRE STAKING METHOD

included. The wires run between each row. Cross wires are then fastened to the wires, thus making a square space for each plant to grow through. As the plants grow taller, the struts which hold the wires are moved upwards. The commercial grower who plants large batches of any one variety will find this method most economical. It, of course, cuts out all tying and therefore makes the cutting of flowers so much more straightforward. A glance at Fig. 13 will, I think, be explanatory.

STOPPING AND TIMING is quite a simple operation with early flowering chrysanthemums. First of all allow the plant to make a natural break, then pinch out the break bud when large enough to handle easily. Some varieties break when quite dwarf, whilst others break at a taller stage. In other words, tall and short break varieties. Laterals are soon produced from these breaks which are allowed to grow up. The number of laterals required, depends upon the purpose for which the plants are grown. If for exhibition, three to five are retained, but commercial growers require ten to twelve. Practically all earlies are flowered on first crowns, which is the first bud produced on the laterals. When these buds are well formed, the side laterals are rubbed out so that the buds will develop. A general rule is that the time required for a fully developed flower is six weeks from the time of the bud showing colour. Some varieties may be less and others longer, but in normal weather six weeks is a fair guide.

SHADING OF OUTDOOR BLOOMS. Exhibitors usually resort to protection of flowers in order to present them in clean condition. Protection is always allowed in show schedules provided the plants are in the open. A general procedure is to erect skeleton frames, over which hessian or frame lights are placed (see Fig. 14). Many exhibitors, however, prefer to open their flowers by the paper bag method and it is certain that this has a lot to commend it, flowers being clean and full sized. Bags should be of ordinary

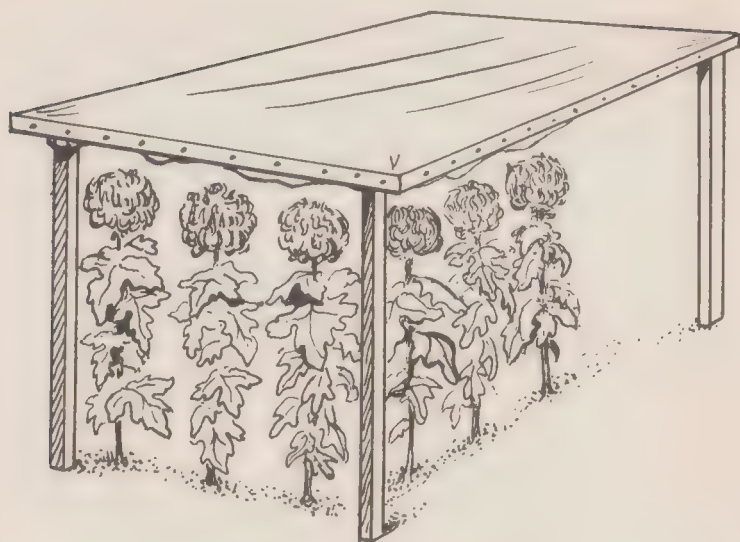


FIG. 14. SHADING OUTDOOR PLANTS

brown paper as used by a shopkeeper. Cellophane or Polythene material is not porous enough. Allow the buds to be nicely showing colour before fixing the bags. It is a good plan also to dust fine powdered lime inside the bags before covering. Add the date on the outside of the bag, so that it will easily be noted how long it has been on. To find how much development has taken place, press the hands on each side. One can tell to a nicety if the flower is well out. Flowers for exhibition which have come from bags should be cut at least eighteen hours before staging. This has the effect of loosening out the petals and the bloom assumes its characteristic shape. Deep water buckets are essential at this stage. Care must be exercised in regard to insect control before covering, otherwise a flower may be utterly ruined. Thrips and aphid would be the most common enemy (see Chapter 21 on pests).

TREATMENT OF STOOLS AFTER FLOWERING. When flowers are cut, stools are lifted and the stems cut down to a foot from the soil level; all heavy leaves and large basal growth should be removed. Plant in good clean new soil, but previously wash all soil from the roots to prevent slug and other insect eggs adhering.

Plant the stools firmly in a cool frame or cool house and give a thorough watering with a rose can. It is seldom necessary to water again until March. Dust a little slaked lime over the beds once during the winter. It will be found that good healthy cuttings will be produced from the end of January onwards to provide stock for the coming season.

SELECTION OF VARIETIES

LARGE FLOWERED

California, <i>rich yellow</i>	Wildfire, <i>reddish bronze</i>
White John Woolman, <i>in- curved</i>	Peach Blossom, <i>peach</i>
Chippendale, <i>chestnut red</i>	Barbara Couper, <i>yellow</i>
Ermine, <i>white incurved</i>	Doreen Yule, <i>yellow incurved</i>
Frank Allerton, <i>yellow</i>	Dusky Queen <i>dark crimson</i>
Jim Riley, <i>amber</i>	Eamonn Andrews, <i>orange amber</i>
Kath Dorward, <i>peach</i>	Golden Sceptre, <i>yellow incurved</i>
Louis Shoesmith, <i>white in- curved</i>	John Cooper, <i>rich bronze</i>
Lucerne, <i>incurved yellow</i>	John Woolman, <i>silvery lilac incurved</i>
Olive Riley, <i>shell pink</i>	Bill Riley, <i>bronze</i>
Pink Pride, <i>rose and gold</i>	Maestro, <i>white incurved</i>
Red Bill Riley, <i>red</i>	Mayford Titan, <i>golden bronze incurved</i>
Red John Cooper, <i>red</i>	Olympic, <i>old gold incurved</i>
Rex, <i>pure white</i>	Red Charter, <i>red</i>
Velvet Gown, <i>crimson</i>	Ruth Abel, <i>flesh pink</i>
Yellow Wings, <i>yellow</i>	Shirley Cream, <i>cream incurved</i>

Shirley Wonder, *amber*
Vera Lynn, *white incurved*

White Wings, *white*
Wm. Mayden, *purple rose*

MEDIUM FLOWERED

Garden Glory, *clear yellow*
Brenda Talbot, *salmon pink*
Brumas, *white incurving*
Chatsworth, *orange bronze*
Covent Garden, *rich amber*
Daydream, *salmon*
Devonian, *crimson*
Diamond, *crimson*
Golden Maid, *golden amber*
Golden Sweetheart, *golden
bronze*

Mauve Princess, *mauve*
Millersdale, *white*
Pink Daydream, *pink*
Red Flare, *red*
Sweetheart, *rose and gold*
Sylvia Riley, *pink*
Tintagel, *crimson*
Typhoon, *crimson*



PLATE XXV PLANTS SUPPORTED ON STANDING GROUND

PLATE XXVI PAPER BAG COVERING FOR OUTDOOR EXHIBITION
FLOWERS





PLATE XXVII

SOLIHULL CHARTER (JAPANESE)

SHIRLEY SUPERB (JAPANESE)



PLATE XXVIII

BASILISK (JAPANESE INCURVED)



PLATE XXIX

FRANK WOOLMAN (NOVEMBER INCURVED)
EDITH WOOLMAN (JAPANESE)



PLATE XXX

COVENT GARDEN (OUTDOOR VARIETY)



PLATE XXXI COVERING EARLIES FOR MARKET FLOWERS



PLATE XXXII

CHATSWORTH—FINE EARLY
OUTDOOR VARIETY NEEDS NO
PROTECTION



PLATE XXXIII CHIPPENDALE—LARGE TYPE EARLY VARIETY

PLATE XXXIV SHIRLEY VELVET—EXHIBITION OUTDOOR VARIETY



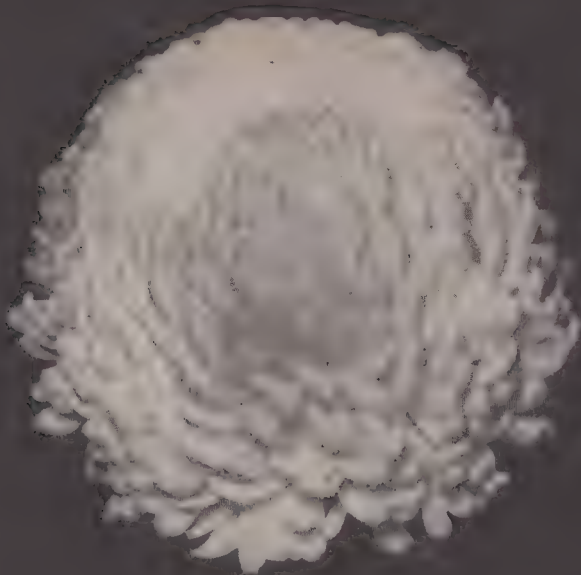


PLATE XXXV ERMINE—EXHIBITION INCURVED EARLY VARIETY

PLATE XXXVI JOHN WOOLMAN—EXHIBITION EARLY VARIETY

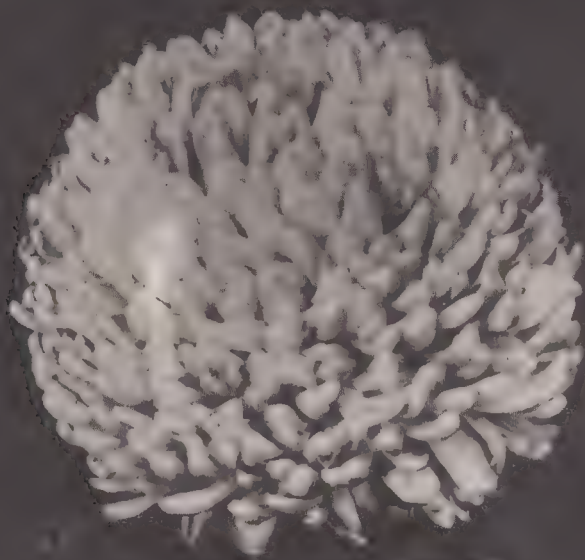




PLATE XXXVII MAESTRO



PLATE XXXVIII LUCERNE



PLATE XXXIX DOREEN YULE

PLATE XL YELLOW WINGS

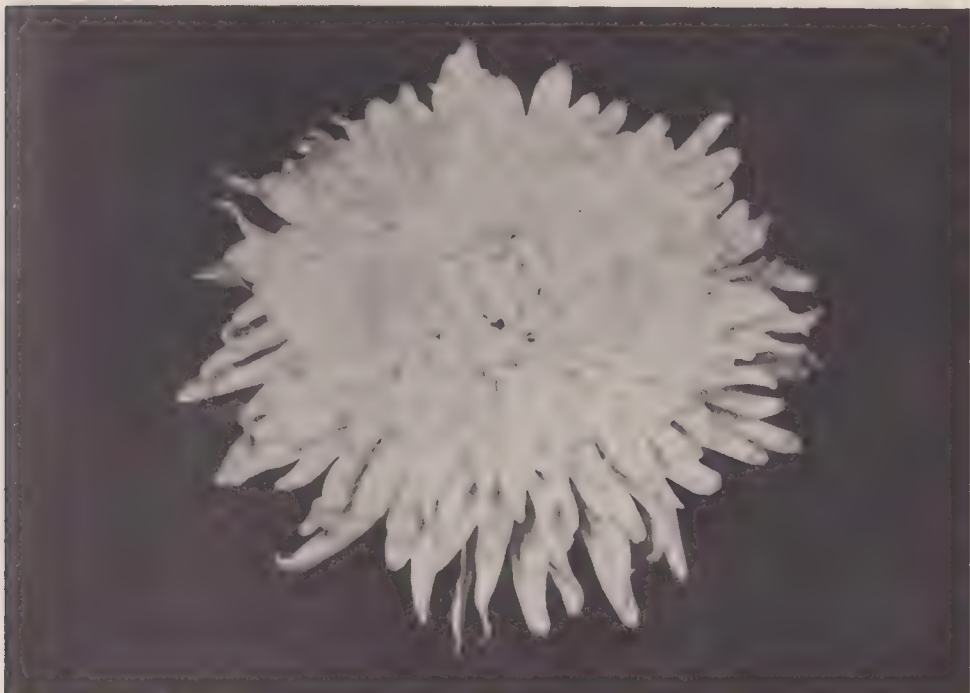




PLATE XLI REX

PLATE XLII CALIFORNIA—NEW YELLOW EXHIBITION EARLY
VARIETY



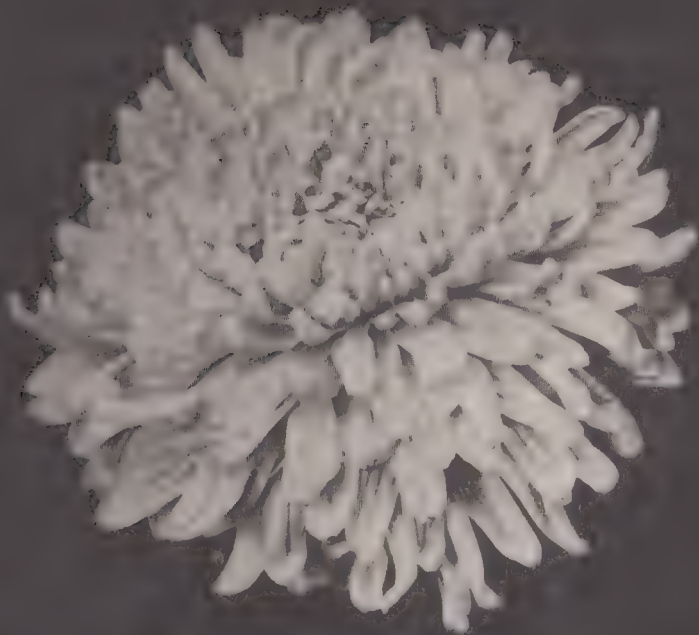


PLATE XLIII RUTH ABEL—LARGE EXHIBITION EARLY VARIETY

PLATE XLIV BRENDA TALBOT—SALMON PINK EARLY VARIETY





PLATE XLV

IRENE PRICE—

EXHIBITION

EARLY VARIETY

PLATE XLVI

KATHLEEN DORWARD—

EXHIBITION

EARLY VARIETY





PLATE XLVII DIAMOND—EARLY VARIETY NEEDS NO PROTECTION

PLATE XLVIII RED BILL BAILEY—LARGE EXHIBITION EARLY





PLATE XLIX RED JOHN COOPER—LARGE EXHIBITION EARLY

PLATE L GARDEN GLORY—EARLY VARIETY NEEDS NO COVERING



12

CUTTING, PACKING AND EXHIBITING

THERE is, of course, a right and wrong in the above title. If, after months of careful cultivation, the exhibitor mars or lessens his chances when at the show bench, much interest will be lost. The same care applies when flowers are sent to market. Flowers of any market variety must be graded to size so that the full return is obtained. It is certain that smaller or poorer flowers in a case will result in lower prices for the whole. Select flowers which are of even size, fresh and not too far open. Uniformity of colour also should be aimed at.

CUTTING. A slanting cut should be made off the plant. Cut and carry the blooms from the house or open ground in dozens. This will be found to be far better than stacking in a truck to transport them to the shed. The latter often results in some of the flowers becoming shattered and foliage spoiled. If your market cases hold two, three or four dozen, then that particular number is placed in deep buckets of water when cut.

PACKING is thereby simplified in this way and the number of cases is easily calculated. Flowers should always stand in water overnight so that each stem is charged, and the consignment reaches the seller in first-class condition. Cases are lined with tissue paper, allowing enough to cover the blooms when packed. As each row proceeds, a roll of paper buff is used so that each flower has a support. Pack from both ends until the required number of blooms is complete. A strut should be fixed firmly across the centre

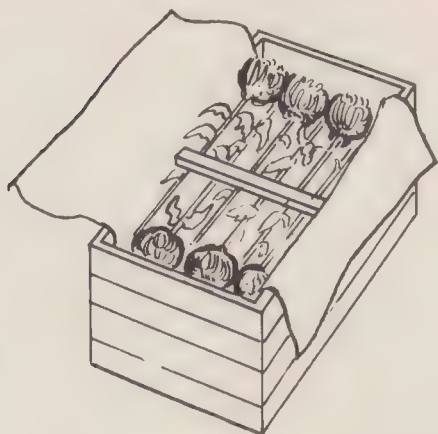


FIG. 15. PACKING FOR EXHIBITION OR MARKET

to hold them all in place and if the work has been done correctly it should be possible to tip the case upside down without flowers moving. Label the end of the box with number of blooms, variety and sender's name.

EXHIBITION BLOOMS. In the case of the large exhibition flowers, there is nothing comparable to the hurdle box. Fig. 16 shown, gives the grower a full idea of its construction. Its materials can be of plywood, hardboard, or even hessian stretched over the framework. The method is that long and short hurdles are alternately slid down the grooves, first your blooms are tied on to a short hurdle, the next row on to a tall hurdle, and so on until the box is completed. If the exhibitor has a long journey, water tubes can be tied on to each stem at the base. Large exhibition flowers are, or should be, stripped of their own foliage and a false stem tied on. It is much easier to tie the blooms into the hurdle box without foliage; the false stems can then be stowed in between the stems of the flowers. Both the stems and the flowers should be given at least twelve hours in water in deep buckets before

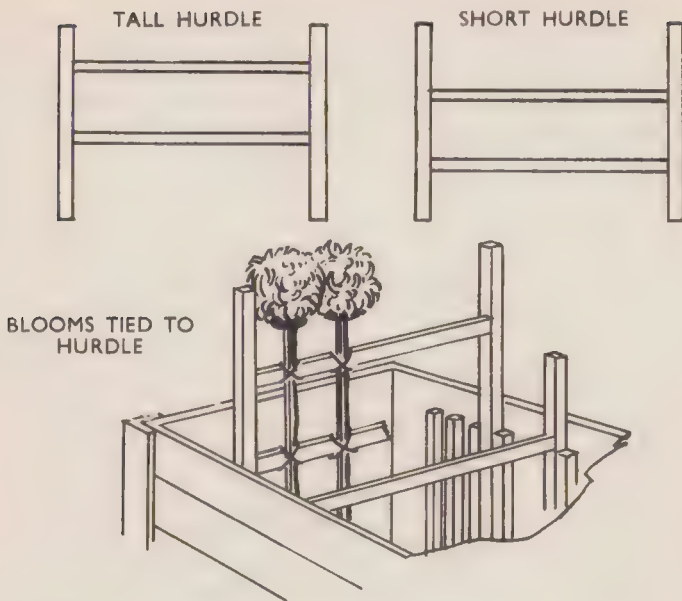


FIG. 16. TYING IN LARGE EXHIBITION BLOOMS IN HURDLE BOX

placing in the box. A strong wire with a $3\frac{1}{2}$ -inch ring at the top is, however, tied on to the flower in order to support the lower or drooping petals. Do not tie this ring too close to the calyx, or much depth will be lost. When tying each row, the hurdles can be wedged at a convenient height, to be lowered when complete. Place a piece of tissue paper between each bloom to prevent petals becoming interlaced.

STAGING EXHIBITION BLOOMS. First study the schedule and be sure you know how many varieties are called for in each class. In fact, blooms for each class can be tied consecutively in the box, thereby saving time at the show. Note the length of stem required and see that colours are nicely blended. Separate the

crimsons from the purples and use the whites and yellows to good effect. Naming, too, is very important. Take out any unruly petal and aim for neatness of the whole. Freshness, good colour for the variety, perfect centres, contour and shape, good hard petals, are points which all good judges look for. Place your class cards on the correct exhibit.

INCURVED VARIETIES. Much the same rules apply as for the large exhibition kinds, except that perfect shape and perfectly incurving centres are the main feature. It is far better to include a smaller flower of ideal form than a larger one which has defects. A grave fault in incurve flowers and one which loses many prizes is that of colour loss at the base. A term "pinking" is applied by the expert grower, so avoid this at all costs.

DECORATIVES. In most schedules these are usually asked for in threes or fives of a variety. Freshness, good centres, *i.e.* not too thin or too tightly packed with small petals. Size is required in the large decoratives, but not at the expense of colour and freshness.

SINGLES. This type is required to have petals of good texture with a proportionately small disc or single centre. Flowers should have three to five rows of petals. A little care in packing singles should be exercised when the flowers are placed across the rolled buffs. A piece of folded tissue paper should be placed over each row to keep the petals from folding over the disc. Three sections of singles are often called for in show schedules—viz., large, medium and small; sprays also are occasionally included. The various sections of each type are explained in the chapter on classification.

OUTDOOR VARIETIES. For exhibition the previous notes apply to early flowering kinds; contour, colour, freshness, good centres and uniformity combined with size. Chapter 7 deals with cultivation, etc., of outdoor flowering varieties.

13

LATE FLOWERING SINGLES

THIS type is very much in favour and has in fact still increased its hold upon the public. For house decoration it has no equal, for the flowers are so refined and full of quality. For exhibition, too, it is peerless. Single chrysanthemums are divided into two sections, viz., large and medium. The ideal single is one which has a medium-size disc and three to five rows of petals. The old type of flower which had only one row of petals has completely gone out of favour owing to the fact they were so easily damaged.

The culture of single chrysanthemums in most details is as that given in Chapter 18 with one or two minor differences. It is not advised that cuttings should be rooted too early; February and March being ideal. Stopping is also rather different and as a general rule most varieties are better allowed to make natural breaks and to flower on second crowns. If required for cutting or market, eight to ten flowers per plant is to be aimed at; therefore carry up four stems from the first stop, and take two on each stem for second crown. For exhibition five to six flowers per plant is considered ideal and this number of laterals may be taken up from the first stop. Buds should be secured during September, to bring developed flowers in November. Very strong growing varieties only are flowered on first crowns, as these would be too late for November exhibitions on second crowns. Varieties such as *Desert Song*, *Broadacre*, *Uranus*, etc., fall into this category. Stopping keys given in specialists catalogues will keep the grower informed.

It sometimes happens that first crown singles produce superfluous petals in the disc, and should these flowers be required for exhibition those central florets must be removed with a pair of tweezers. First crown buds always produce more petals than second crowns. One great exception, in days gone by, was that single chrysanthemums were far too tall for the ordinary amateur greenhouse, this fault no longer applies, for raisers have successfully concentrated on dwarf plants, without loss of quality or size of flower.

SELECTION OF VARIETIES

Crimson Shirley, <i>the best crimson to date</i>	Shirley Princess, <i>amber apricot, large</i>
Annina, <i>large refined flower, chrome yellow</i>	Tonga, <i>amber, very attractive</i>
Albert Cooper, <i>the most refined yellow for exhibition</i>	Uranus, <i>light bronze</i>
Brenda, <i>orange-bronze medium disc</i>	Woolmans Glory, <i>terra-cotta or tawny bronze grand</i>
Broadacre, <i>largest and best white yet</i>	Yellow Broadacre, <i>sport from Broadacre</i>
Desert Song, <i>tawny orange, large, dwarf grower</i>	Bedouin, <i>orange, very large, dwarf</i>
Paula, <i>red-yellow zone round disc</i>	Peter Robinson, <i>large yellow</i>
Royal Velvet, <i>large velvety crimson</i>	Allegro, <i>beautiful pink, very refined</i>
Shirley Gold, <i>deep yellow, solid petals</i>	Orange Glory, <i>lovely colour, very free flowering</i>

PLATE LI
PLANT STAKED AND TIED
IN FINAL POT



PLATE LII
NATURAL FIRST CROWN
BEFORE THINNING





PLATE LIII
 DESERT SONG—
 LARGE
 NOVEMBER SINGLE

PLATE LIV
 JEAN HENNING—
 NEW NOVEMBER SINGLE





PLATE LV BEDOUIN—NEW LARGE EXHIBITION NOVEMBER SINGLE

PLATE LVI CRIMSON SHIRLEY—NEW LARGE EXHIBITION NOVEMBER SINGLE



CULTIVATION OF INCURVED VARIETIES

IT is said that the incurved types are the most beautiful of all chrysanthemums. Be that as it may, it is true that they are the oldest or earliest chrysanthemums in history. The Chinese first cultivated them in 500 B.C. These flowers were small, and it was in 1838 that Mr. J. Salter raised the first large incurved, which he named Queen of England. With a few exceptions, the cultivation of incurves is much the same as for other types. January and February are the most suitable months for inserting cuttings. Compost is as for other types. The sizes of pots must be carefully watched—8½-inch for the stronger growing varieties such as Buttercup, Curry, Enid Woolman, etc., whilst for varieties such as Milton Gray, Progress, Romance, etc., 7½-inch is more suitable. Heavy feeding is not so necessary, therefore the number of fertilizer top dressings may be reduced to one each month. The number of flowers per plant should be four in the weaker growing kinds, and five in the stronger ones, so that this required number of laterals can be taken up from the break, instead of two as in the large exhibition Japs.

Stopping and timing also varies from the larger types, seeing that most incurves are flowered on second crowns. Mere size is not the aim of the incurve section, but quality, good finish and globular form. It will therefore be necessary for the grower to pay strict attention to the stopping and timing key given elsewhere in this book.

During the time the flowers are opening, the keen exhibitor pays great attention to the centre florets, some of these being

removed each day, if they are too numerous to finish perfectly. It is for this very reason that second crowns are mostly used, in order to reduce the number of petals, and so each one falls into place to complete the perfect shape and contour. The exhibitor should avoid flowers which are fading in colour at the base. Many points are lost on the Show bench through this fault. It is as well, if at all possible, to choose a shady part of the greenhouse when housing, or in any case the glass may be shaded; sunlight has the effect of causing discoloration at the base. Here is an up-to-date selection of incurved varieties.

George Ridgeway, *mahogany bronze, neat flower, medium size*

Celia, *delicate pink, long stems*

Evelyn Laye, *bright yellow, neat and dwarf*

Frank Woolman, *amber apricot, fine quality*

Lilac Progress, *beautiful sport from Progress*

Mayford Primrose, *good quality flower, neat and perfect*

Priscilla Lewin, *clear yellow, full and solid*

Salmon Progress, *attractive colour, tipped gold on each petal*

Annie Curry, *pure white, full flower*

Connie Mayhew, *primrose yellow, large flower*

Cream Progress, *fine cream sport from Progress*

Enid Woolman, *clear yellow, large and full*

Golden Curry, *golden sport from Yellow Curry*

Maxine, *among the finest whites*

Mayford Flush, *white with flush of pale pink*

Milton Gray, *perfectly shaped flower, primrose in colour*

Vera Woolman, *beautiful flower, very hard petals*

White Progress, *grand white sport of the Progress family*

Capt. Goffe, *orange red and chestnut, much wanted colour*

Shirley Buff, *buff shading to red, large*

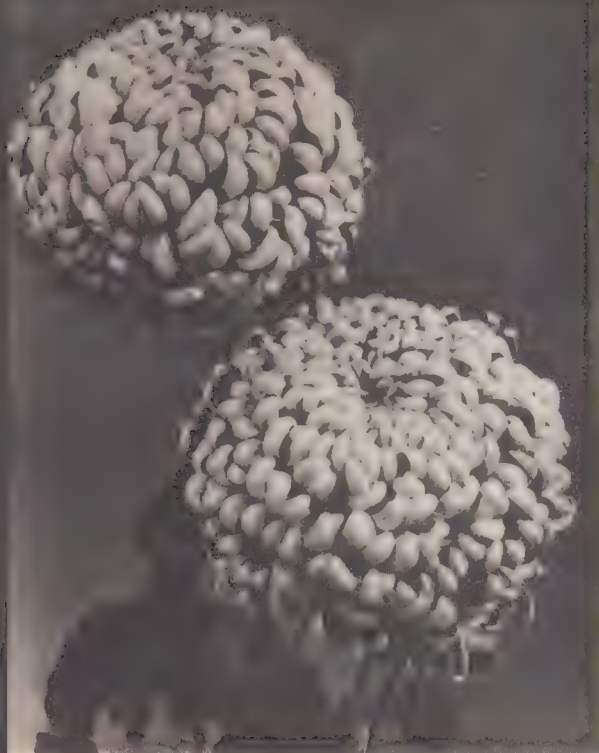


PLATE LVII
BRONZE MCLEOD—
EARLY GARDEN VARIETY



PLATE LVIII
MECCA—
NOVEMBER INCURVED
VARIETY

PLATE LIX
GEORGE MCLEOD---
EARLY GARDEN
VARIETY



PLATE LX
CAPT. GOFFE---
RED INCURVED
FOR NOVEMBER



15

PERPETUAL FLOWERING CHRYSANTHEMUMS

A COMPLETELY new type comprising only two varieties at the moment, both being introduced by H. Woolman Ltd., Shirley, Birmingham. The advantage of this type is that they may be flowered at any time of the year simply by rooting cuttings in succession. Cuttings inserted in January and therefore rooted in February will flower in $3\frac{1}{2}$ -inch pots in March to be used as pot plants. When the flowers from this size have finished, the plants may be potted into a 5-inch pot. Basal shoots are produced and the plant will flower again in a short time. By this successional rooting right up to July, flowers are produced until the end of the year. The early flowers, which are double and about 4 inches across, provide splendid material for the florist. The height is 12-15 inches; no stopping is required. Plants may be bedded out to make a garden display. The two varieties are Woolmans perpetual white and its yellow sport.

16

KOREAN CHRYSANTHEMUMS

THIS type is very popular with some growers, mainly I think because the shades of colouring are rather unusual. It was assumed when they were first imported from the U.S.A. that they would withstand quite a lot of frost, but this has not been borne out by experience. Some varieties bear double flowers, whilst others are single. Cultivation is very easy and no stopping is required. Plant out as for ordinary early flowering chrysanthemums with support for the taller kinds. They flower in September and October. Height $1\frac{1}{2}$ to $2\frac{1}{2}$ feet.

SELECTION OF VARIETIES

Apollo, *bronze single*
Citronia, *bronze double*
Diane, *pink single*
King Midas, *yellow double*
Louis Schling, *red single*
Mercury, *salmon single*

Romany, *crimson double*
The Moor, *purple double*
Topsy, *salmon single*
Venus, *pink single*
Vulcan, *red single*

17

OUTDOOR POMPONE CHRYSANTHEMUMS

THIS type has made great strides in recent years, and many raisers have concentrated upon them. They are really fine for bedding, making as they do a wonderful show in the garden in September and October. Their height is from 12 inches to 2½ feet. Those marked T are the taller kinds. They are also suitable for pot culture, for indoor decoration, or for window boxes in the autumn.

SELECTION OF VARIETIES

Bo Peep, <i>pink</i>	Pink Bouquet, <i>pink</i> , T.
Cathie, <i>pink</i>	President, <i>red</i>
Denise, <i>yellow</i>	Snow Elf, <i>white</i> , T.
Jante Wells, <i>yellow</i> , T.	Tommy Trout, <i>amber</i>
Lindie, <i>yellow-bronze centre</i> , T.	Toreador, <i>crimson</i>
Lustre, <i>copper</i>	Whaddon Bride, <i>bronze</i>
Mignon, <i>yellow</i>	White Bouquet, <i>white</i> , T.
Mosquito, <i>golden yellow</i> , T.	



PLATE LXI DENISE—OUTDOOR POMPONE VARIETY

PLATE LXII CATHIE—OUTDOOR POMPONE VARIETY



18

EARLY SINGLE CHRYSANTHEMUMS

CULTIVATION of these are as given for the double varieties, the main difference being in the stopping. Most early singles are grown as spray, either for cutting or house or garden decoration. There is, therefore, no stopping to be done, except that I would advise that the centre bud in the final flowering sprays be removed. This bud often flowers much earlier than the surrounding buds and so is really wasted. If finer sprays are required for exhibition, some thinning of laterals can be made so that the plant will have to carry less sprays. In the case of disbudded flowers for exhibition, the usual trimming out of the side shoots is resorted to, and the centre bud only retained. Six or eight flowers are recommended in this case. On disbudded plants it will be noticed that many good basal shoots are produced. These should be retained to provide lovely coloured sprays after the main flowers have been cut.

SELECTION OF VARIETIES

Doreen Woolman, *golden
orange*

Firebrand, *terra-cotta red*

Gladys, *creamy colour suffused
apricot*

Jean, *orange terra-cotta*

Kay, *large yellow*

Kitty, *rose pink, white ring
round disc*

Major Robertson, *crimson scar-
let*

Marvo, *chestnut with yellow ring*

Nectar, *apple blossom*

Shirley Crimson, *very free*

Yellow Charm, *fine for garden
display*

PLATE LXIII
ANNINA—
YELLOW
NOVEMBER SINGLE



PLATE LXIV
YELLOW CHARM—
OUTDOOR
SPRAY VARIETY
NATURAL GROWTH



CULTIVATION OF DWARF CHRYSANTHEMUMS

THE art of growing dwarf chrysanthemums is practised by many growers, both trade and amateur. They are most useful to sell as pot plants, or to provide material for furnishing greenhouse or conservatory stages. Many amateurs possess greenhouses which do not provide head room for the tall kinds and often the staging is not portable; this chapter will therefore be found most useful in such cases.

Cultivation is rather different to that of growing for exhibition flowers. Cuttings should be inserted in March so that they will be rooted in April, or even rooting in May is often very successful. Pot the rooted cuttings into 3-inch pots and stand on a cool greenhouse stage. Give them just enough time in this position to become established and then move into a cold frame. Watch the progress of the plant and pinch out the top when growth is taking place. Do not allow them to become root-bound. Knock out the pots occasionally and when roots are going nicely round they will be ready to pot into 5- or 6-inch pots. The compost and method of potting should be as given in the chapter dealing with that operation. Stand these freshly potted plants in a cold frame until they begin to grow, after which they may be plunged in a bed of ashes, with the rim of the pot just above the ash level. This is done to prevent drying out during the growing season. They must not be allowed to get dry, and during warm weather water with a rose can so that the water space is filled up. Occasional top dressing with fertilizer will be advantageous, and also, towards the end of August-September, animal manure water will be

beneficial. Varieties which flower in October and November will suffice with the one stop given in the 3-inch pot, but December varieties may have another stop at the beginning of July. House the plants from mid to end of September. It is good to stand the pot upon a slate when plunging in the ash bed, to prevent worms entering and also to prevent roots growing through.

SUITABLE VARIETIES

Cote, <i>crimson single</i> , November	Rose Poitevene, <i>rose</i> , November
Blanche Poitevene, <i>white</i> , November	Salmon Poitevene, <i>salmon</i> , November
Yellow Blanche, <i>yellow</i> , November	Tavistock, <i>terra-cotta</i> , November
Loveliness, <i>pink</i> , November	Ulster, <i>maroon</i> , November
Loveliness, <i>sports</i> , November	Yellow Hammer, <i>yellow</i> , November
Coralie, <i>shell pink</i> , November	Aurora, <i>orange-bronze</i> , December
Crimson Velvet, <i>crimson</i> , November	Favourite, <i>white</i> , December
Enton Beauty, <i>crimson</i> , November	Favourite, <i>sports</i> , December
Harry Morris, <i>white</i> , November	Magnet, <i>terra-cotta</i> , December
Marie Morin, <i>white</i> , November	Red Magnet, <i>red</i> , December
Molly Nicolson, <i>salmon</i> , November	Shirley Late Red, <i>red</i> , December
Rising Sun, <i>yellow</i> , November	Yellow Aurora, <i>yellow</i> , December

SOME MIRACLES IN CHRYSANTHEMUMS OF JAPAN

THE chrysanthemum was first grown in China, but it is to Japan that we owe so much. In the art of growing specimen plants the Japanese were, and still are, past masters. In the present day, however, they cultivate and improve a type known as "Fantasies." These are most fantastic quill petal types, having thin petals not much thicker than a piece of cotton. Some varieties have petals 15 inches long, which curl gracefully at the tips. Some have as many as 350 petals to each flower. These large fantasies are opened over a wire ring to support the flower and others are straight quilled of various thickness. Many hairy varieties are cultivated.

Training, also, is expertly practised. Plants resembling azaleas are most beautifully grown. These plants are trained in various shapes to be fitted together like a jigsaw puzzle at the exhibitions. Nowhere in the world are the magnificent cascade types grown so well, for it is usual to see plants 10 feet long and of great width, covered with thousands of starry flowers. Standard plants with stems up to 4 and 5 feet high, bearing 200 or 300 flowers, are often seen.

Edible chrysanthemums are also cultivated, the petals being eaten as a salad, and it is said that white varieties are most in demand. These varieties have very broad petals, containing as many as 250 with hardly any calyx. They are just bred to be of the greatest value for eating.

Another type, called the brush type, is worth a mention. This has straight thick quills protruding from a strong calyx, much

resembling a paint brush. I have been most fortunate to procure some of these remarkable fantasies, which I hope to exhibit next season—1956. There is no doubt that they will be much admired over here, but the original names will have to be curtailed. Just fancy, Yado-no-Hitomoto or Kojo-no-Tsuki. Yado and Kojo will look better in England. Isn't it fantastic?

21

PESTS AND DISEASES

Pests

IT cannot be said that chrysanthemums are heir to a great number of pests and diseases, in fact they are less liable than many other species. Their chief enemies are aphids (green and black), thrip, leaf miner and sometimes rust. All except the latter can be controlled by nicotine, either as a wash or by fumigation of indoor plants. Insecticides have in later years, by reason of scientific work, improved considerably, many pests hitherto very difficult to control can now be eradicated. The very recent introduction, Parathion, has given us perfect control over attacks of eelworm, whereas the old method of warm water treatment did not always effect a perfect cure. Parathion, however, is extremely poisonous and very rigid rules and regulations have to be observed, including protective clothing. There will no doubt be a safe prescription as time goes on.

There are also systemic insecticides, those which by inserting a tablet into the soil, or by watering in, create a poisonous effect upon any sucking insect and thereby keep the plant free. One such brand, known as Isopestox, can be recommended. This preparation is now manufactured in stick form, and the action of pushing one of these sticks into the soil gives a good control. Good cultivation is of course always a pointer to pest control—healthy environment, open summer quarters, clean pots, clean soil and measures to prevent attacks, rather than treatment, which may have been delayed too long.

Aphis, of two kinds, green and black, are the most usual pests of chrysanthemums, although mealy aphis sometimes is seen. Green and black aphis attack both stem and centre of the shoots, but mealy aphis is seen only in the centre. Control of these insects is, however, very simple—by spraying with nicotine wash, 1 tablespoonful to 2 gallons of soft warm water. It is well to spray once every three weeks. Campbell's nico soap is recommended.

Thrip. These insects are sometimes very troublesome, mainly because they are buried right down in the centre of the shoot. They are black and yellow in colour and are about $\frac{1}{16}$ inch long. Their action is to suck the sap from the tiny embryo central leaves, with the result that these leaves grow out into a narrow ribbon shape. Thrips are also very destructive to the flowers when opening, their mission being to eat the colouring pigment from the petals. Thus a red flower turns brown and white flowers look dirty. Control, again, consists of nicotine spray, not only of the shoots when growing, but in the case of outdoor flowering kinds, the flowers when opening can be sprayed. Thrips get ahead during periods of hot, dry weather, and so frequent overhead spraying with a fine rose can with cold water is a great deterrent. It is noticeable that when the dewy or misty nights of September arrive, with consequently lower temperatures and more moisture, thrip practically disappears, as it does also on cold wet seasons.

Earwigs sometimes trouble the grower, and although not a major pest can do much damage. They are very selective and often attack certain varieties to the exclusion of others. Earwigs are often carried to the plants in bundles of canes, and it is well to dip each bundle into boiling water at each end before sticking the plant. In the case of a bad attack, DDT wettable powder is a sure cure.

Capsid Bug. These can be divided into three species, bishop

bug, common green and potato capsid. They have many host plants, including groundsel, currant, gooseberry and elderberry. Therefore weed-free environment is advised. The damage they do is to make the flowers malformed, and often a flower may be perfect on one side, but no petals on the other, just as if they have been cut in half. The insect is greenish white and very slender, and so active as to quickly fly away when a person walks by the plants. DDT is the perfect control; either spray or dust.

Leaf Miner. This insect can be extremely troublesome and can disfigure the plant very much. A midge type of fly lays eggs on the underside of the foliage, which in turn hatch out into maggots. These maggots, or larvæ, tunnel between the leaf tissues, causing white lines all over the foliage. Eventually, of course, these maggots hatch out into the perfect fly. Host plants, groundsel, thistle, or any of the Compositæ should be cleared away. Campbell's nico soap is the cure; 1 tablespoonful to a gallon of warm water. The smoke insecticides such as BNC Gammexane, etc., are useful when under-glass treatment is needed.

Eelworm. This is a microscopic insect and symptoms of attack are; drooping of foliage, parts turning rusty and brown, and eventually the dropping of all attacked foliage. Should an attack be noticed, do not attempt to cure it whilst growing, except by taking off affected leaves. Keep leaves free of the ground when an attack of chrysanthemum eelworm has been made. It is well to exclude them from that piece of ground for three years to enable the eelworm population to die out. Control can be had by treating the stools with warm water. They should be immersed in water heated to 110° F. for twenty minutes. Some commercial growers give 120° F. for ten minutes. This immersion destroys the nematode worm in the leaf. The stools are then planted in clean soil and good healthy cuttings will grow in about three weeks. The Parathion spray is far better, because this can be administered whilst



FIG. 17 MIDGE



FIG. 18 LEAF MINER AND FLY

the plant is growing, but as I have previously pointed out in this chapter, the amateur grower should make himself conversant with the perils and regulations prescribed.

Midge. This pest need not worry amateur growers unduly, because regulations governing it among commercial growers are so rigid as to prevent any midge infected stock being distributed. The egg-laying fly is very distinctive, having a lobster-red body with long black legs and antennæ. It lays eggs on the underside of the leaves. They pupate and emerge in the shape of a white pointed gall underneath the leaf, the adult fly hatching out. Control is by alternate spraying with nicotine and DDT twice weekly.

Wireworm. Larvæ of the click beetle; its yellow casing of the body being very conspicuous. When making up soil for rooting cuttings, any wireworms in the soil can usually be detected. Very little, if any, harm is done by them in the potted stages of the plant, owing to the firmness of the soil. If trouble is experienced on plants in the open ground, slices of carrot can be attached to a small stick and these can easily be examined each day.

Cuckoo Spit is the larvæ of the frog-hopper moth; the frothy excretions can, when they appear in spring, be easily syringed off, otherwise malformation of the central leaves occurs. The adult insect seen in autumn has hard cased wings and owing to its remarkable hopping or jumping act is very difficult to capture. Its damaging effect is that of boring tiny holes in the stem under the bud. It is seldom found in numbers large enough to become a serious menace.

Leatherjacket. A well-known brown grub, coming from the crane fly or daddy longlegs. It attacks, principally, outdoor varieties by gnawing the bark around the stem at ground level. Control: 1 oz. of Paris green, mixed into a handful of bran. Apply round the stems of plants affected.

Diseases

Rust is recognized by pustules of brown or reddish spores, which first of all show on the undersides of the leaves. This then shows ringlets of yellow on the tops of the leaves. In or near large industrial towns, rust is seldom troublesome, presumably because of sulphur and sooty fumes in the atmosphere. It is rather more of a parasitic nature than a disease. The most effective control is by sulphate of potassium (liver of sulphur); $\frac{1}{2}$ oz. to a gallon of soft water. First dissolve the sulphur in a smaller amount of warm water and then dilute as above and spray the undersides of the foliage. It is often better to lay the plant down horizontally, rolling over the under part so that every particle is wetted by the spray. As in other diseases or parasitical troubles, the host plants are groundsell, thistle, knapweed, etc.

Mildew is a parasitic trouble which seems to occur whatever the season may be. It often attacks the plants in the early stages of growth and should be rigidly kept clear. There are many pro-



FIG. 19

MOSAIC

RUST

prietary controls obtainable; or again the liver of sulphur, $\frac{1}{2}$ oz. to 2 gallons of water, with the addition of $\frac{1}{2}$ oz. of slaked lime, is very effective. For indoor treatment, the very best control is by the use of Campbell's sulphur vaporizer, which controls mildew for the whole of the winter by one application, immediately after the plants have been housed.

Verticillium Wilt. Symptoms are brown and yellow streaks in the foliage and also along one side of the stem. Sometimes just one shoot is affected. Soil in which tomatoes have been grown sometimes produces this condition and therefore should not be used. No control is yet known. Burn any plants that are affected.



FIG. 20. VERTICILLIUM WILT

Mosaic disease. No symptoms are apparent until the flower is produced, then we find fasciated or thin needle petals, often curled up and twisted. Flowers sometimes produce streaky colours. Reds are streaked yellow, pinks are lined white and flowers seldom open properly in the centre. Certain varieties are prone to attack; notably Favourite and its sports, Solomon and Friendly Rival. This virus condition, like many others, has no known control. It is important that aphids and any sucking insects be kept under control or many healthy plants will be infected with the virus. When procuring new stock it is well to deal with firms of repute, who dare not overlook any stock so contaminated. Burn any affected plants.

Leafy Gall. Often a troublesome disease, and one which can be recognized by a mass or conglomeration of confused growth at the base of the plant. Result: no healthy cuttings. This is considered a bacterial disease. Do not attempt to take cuttings from stools in this condition, for this would only propagate the trouble. Do not use a knife on a plant in this condition for fear of transmission to a healthy plant. Plants with even a suspicion of leafy gall must be burned at once.

CHRYSANTHEMUM SPORTS OR MUTATIONS

AN interesting feature is sports, *i.e.*, when a variety throws a flower or flowers of a different colour to that which the variety should be. Sometimes a variety remains true to colour for quite a number of years and suddenly in one year it may sport in several parts of the country. Many instances can be cited of varieties behaving in this way. Other instances are that a new or recent variety will sport very early in its life.

Another very interesting thing is that most varieties sport once only in their lives, and remember varieties do have a span of life, just as do any other beings. In other words, varieties deteriorate during successional propagations by vegetative means. Some varieties last in perfect condition much longer than others, the difference being approximately five to twenty years. Those which have deteriorated usually are not seen again on the exhibition table. Thus the need for new seedling varieties is urgent.

Coming back to the subject of this chapter—"Sports"—certain shades are liable, notably those pink shades which have a touch of lilac in their make-up, to sport to a salmon colour. Whites, too, often sport yellow, but never yellow to white. It is firmly believed that mutation is due to genetical changes within the plant. Genes present in the plant cells are arranged in varying ways on rod-like structures known as chromosomes. These agencies have a controlling influence on all characteristics of plant life, such as tallness, dwarfness, colour of flower and stem, time of flowering, shape of leaf, fullness or number of petals. In fact, everything is controlled genetically in man, beast, bird or plant. To describe this mechanism

throughout all its phases would require a book larger than this one, except to say that the gene cells are always dividing and multiplying and that chromosomes in any genus of plant have a definite multiple number and that it is impossible to cross genera of a different multiple count. Thus chrysanthemums with a multiple of nine, *i.e.* 9-18-27-36-54, will not cross successfully with genera with a different multiple. You may say, what has this to do with chrysanthemum sports? Quite a lot; for it is when the mechanism of genes and chromosomes fails to follow the ordinary routine to divide in the proper way, that a sport is liable to occur. Sports can follow with different changes such as height, earliness and type of foliage, but the chrysanthemum sport is usually colour of flower. Experiments have been made on some plants in order to induce sporting, such as X-ray of young plants, temperature changes or shock, colchicine chemical treatment; such experiments are successful in some flowers, but I have yet to hear of success with chrysanthemums. Perhaps our scientists will produce chrysanthemum sports some day. I wonder if it would be wise.

23

CLASSIFICATION OF VARIETIES

THIS is a system by which varieties of varying types are graded or placed into their different categories; a system adopted by the National Chrysanthemum Society to guide (so it is said) other societies as to the correct varieties which are to be exhibited in particular classes. Its application has not cured all the ills and doubts for societies throughout the land and no one can say that it is an infallible guide to the exhibitor. The main complaint which I see is that many varieties classified by the floral committee of the N.C.S. turn out to be far from correct especially regarding size, and it is these cases which puzzle society officials and annoy exhibitors. It is certain that a greater degree of thought and knowledge should be brought to bear upon the subject by those responsible, for there is nothing more distasteful to the exhibitor, or the show official, than that exhibits should be disqualified owing to a technical error. If, however, a society desires to judge according to N.C.S. rules, then it must adhere to the varieties so classified in any one section. Perhaps one day the system will be made more perfect. The sections laid down at present are as follows:

NOVEMBER FLOWERING VARIETIES

SECTION I. EXHIBITION INCURVED. (A) Large Flowered
(B) Medium Flowered

„ II. LARGE EXHIBITION

SECTION III. LARGE EXHIBITION INCURVING

- „ IV. MEDIUM EXHIBITION
- „ V. REFLEXED DECORATIVES
- „ VI. INCURVING DECORATIVES
- „ VII. ANEMONES
 - (A) Large flowered
 - (B) Medium flowered
 - (C) Small flowered
- „ VIII. POMPONES
 - (A) Large flowered
 - (B) Small flowered
- „ IX. SINGLES.
 - (A) Large flowered
 - (B) Medium flowered
 - (C) Small flowered
- „ X. SPIDERY, PLUMED AND FEATHERY
- „ XI. ANY OTHER TYPES

OCTOBER FLOWERING VARIETIES

- „ XVI. REFLEXED
- „ XVII. INCURVING

EARLY FLOWERING VARIETIES

A variety is deemed to be early flowering if it opens its blooms in a normal season before October 1st in the open ground without protection. For exhibition, flowers may be protected or covered.

- SECTION XX. INCURVED. (A) Large flowered
(B) Medium flowered
(C) Small flowered
- „ XXI. REFLEXED. (A) Large flowered
(B) Medium flowered
(C) Small flowered
- „ XXII. INCURVING. (A) Large flowered
(B) Medium flowered
(C) Small flowered
- „ XXIII. SINGLES. (A) Large flowered
(B) Single flowered
- „ XXIV. POMPONES. (A) Tall
(B) Dwarf
- „ XXV. ANY OTHER TYPES.

The definition of a spray, is that it is the last flowering growth with central and surrounding flowers and bulbs, attached. Thus only one lateral stem is indicated.

INDOOR VARIETIES TO FLOWER IN
COLD HOUSES

MANY amateurs have asked me to give notes on varieties suitable for flowering in cold houses in November and early December. It is true that to produce flowers in December without heat is rather a tall order, but with the aid of one of the various "blue flame" heaters this difficulty can be overcome. The amount of frost which is experienced is usually very slight and it is just a matter of keeping the air dry, which is so important.

Varieties, too, play a great part, and one desirable quality is that they must have hard petals and medium foliage. In some of the war years we were prohibited by law from using fuel for flower production, but with thought and care our chrysanthemums were flowered. The general cultivation given in other chapters is followed. The variation starts when plants are to be housed. Instead of adhering to a mid-September date, the plants are left outside until October; the only care being to prevent damage from early frost by covering with newspaper over the tops. If a number of plants are to be dealt with, it is a good plan to carefully lay the plants together, so that light mats may be thrown over them. When housed, the air vents must be kept open throughout October in order to keep the foliage hard; a good plan also is to give a little more space to each plant so that circulation of air is around the plants. During November, if weather is misty, reduce the air space but do not close the vents entirely, otherwise a stuffy atmosphere will prevail. Buds will open slowly but petals will be of good texture, due to higher temperatures having been

avoided. On cold or misty nights at the end of November and December it will be prudent to warm the air with the heater, but on no account must the vents be entirely closed, or air circulation will suffer.

The amateur grower will be pleasantly surprised, by following one or two simple rules, to find how the cost of fuel, exorbitant often in these days, can be reduced without serious loss of quality. The following varieties should be very suitable for the cold house.

Avril Doig, <i>strawberry</i> , November	Nigeria, <i>crimson</i> , November
Golden Guinea, <i>yellow</i> , December	Rayonante, <i>pink</i> , quill, November
Amber Delight, <i>amber</i> , December	Romance, <i>yellow</i> , November
Coralie, <i>shell pink</i> , November	Shirley Garnet, <i>carmine red</i> , November
Crimson Velvet, <i>crimson</i> , November	Say Edgar, <i>purple</i> , November
Enton Beauty, <i>crimson</i> , November	Worthing Success, <i>lilac</i> , November
Golden Coralie, <i>gold</i> , November	Zanzibar, <i>terra-cotta</i> , November
Golden Pride, <i>yellow</i> , November	Aurora, <i>orange</i> , December
John Michael, <i>pink</i> , December	Deep Pink Favourite, <i>pink</i> , December
Loveliness, <i>pink</i> , November	Magnet, <i>terra-cotta</i> , December
Marie Morin, <i>white</i> , November	Shirley Late Red, <i>red</i> , December
Molly Nicolson, <i>salmon</i> , November	The Favourite, <i>white</i> , December
	Yellow Aurora, <i>yellow</i> , December



PLATE LXV TURQUOISE—NEW DECORATIVE VARIETY FOR NOVEMBER

PLATE LXVI OLIVE BELL—NOVEMBER DECORATIVE



PLATE LXVII

AMBER PERFECTION—
FINE EXHIBITION
INCURVING DECORATIVE.



PLATE LXVIII

ORIENTAL—
GRAND OCTOBER
FLOWERING DECORATIVE.



CHRYSANTHEMUMS FROM SEED

MANY growers often wonder how it is possible to produce chrysanthemums from seed, for whilst it is possible that in ordinary annual chrysanthemums, and often in early flowering singles, seed may be produced by natural agencies such as insects, etc., it is a very different story when one has to produce seed from the highly bred hybrids which are nowadays seen in the garden, greenhouse, or on the exhibition table. These are seldom seeded naturally or even self-fertilized; therefore plants required for seeding have to be specially cultivated for the purpose.

CULTIVATION

Insert cuttings in the usual way in January, pot up into 3-inch pots when rooted, in a compost of riddled turf with a sprinkling of leafmould and sand. No feed, manures or fertilizers must be used. The plants must be grown in a semi-starved condition. The next and final potting should be in 5- or 6-inch pots. Compost as follows: six parts fibrous chopped loam, half part stable manure and a sprinkling of lime. Water should be given sparingly at all times, the idea being to keep the plants in a hard condition. Stopping should be made to produce plenty of laterals, which later will produce flowers with very few petals and be quite single, although the variety may be a double one. Plants are removed to an open frame when frosts are over.

BUD PRODUCTION

It is, of course, well known that the chrysanthemum is a short

day plant and therefore flowers in autumn and winter, but for seeding purposes bud production must be accelerated by artificial means. Plants are darkened from, say, 6 p.m. in the evening, to 6 or 8 a.m. the next morning. This process usually commences about the end of June and the plants receive about twelve to fourteen hours' darkness out of each twenty-four. It will be seen that this process produces buds in all the laterals, and the time for buds to appear is about four weeks after darkening commences. When the buds show colour they are removed into a moderately warm greenhouse to be prepared for crossing.

THE CHRYSANTHEMUM FLOWER

Belonging as it does to the genus "*Compositæ*," the flower is really a cluster of flowers in one head. In other words, it is composed. See Fig. 21.

The various organs depicted in the diagram will give the hybridizer a good idea of what to look for, to help and aid him in the operation of crossing. Most of the *genus Compositæ* are bisexual, *i.e.* the stamen which contains or holds the pollen becomes the stigma after the pollen has left the organ. Some genera of plants breed true, whilst others do not, and the chrysanthemum is of the latter. Thus if two flowers are intercrossed, although both are of the same colour, the resultant seedlings will give flowers containing all colours of the rainbow. There are, however, ways and means of overcoming this contingency, but seeing that it entails a lot of genetical calculations and changes, it would be out of place in a book of this kind.

CROSS-POLLINATION

Tools required are two fine camel-hair brushes, a pair of tweezers, a bottle of methylated spirit and a pair of scissors. The actual operation is to transfer pollen from the stamen of one flower to the stigma of the other with the brush. When a cross between two varieties has been made the brush is then stood in the spirit

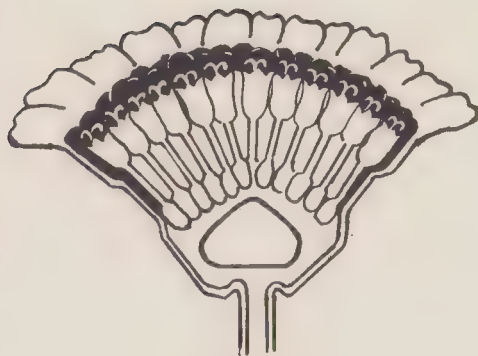
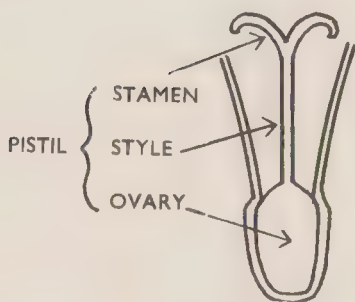
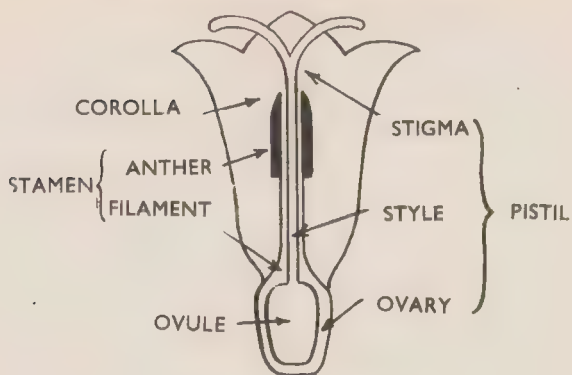


FIG. 21

ORGANS OF A CHRYSANTHEMUM FLOWER

bottle and the next cross made with the other brush. The single flower heads are trimmed closely round with the scissors in order to gain easy access to the organs. Should any mis-shaped or fasciated petal be present, it should be pulled out with the tweezers.

The fertilization which takes place after a successful cross is made by a pollen tube which grows downward to fuse or fertilize the ovary.

LABELLING CROSSES

A very important operation for true records must be made. The head or flower which has received the pollen should be first named; thus Amethyst $\times$ Birmingham means that pollen from the variety Birmingham has been transferred to the variety Amethyst. In this way when reciprocal crosses are made the raiser can know which cross has been the more successful.

SAVING THE SEED

When the work of crossing has been completed the house should be kept at a temperature of sixty degrees or thereabouts, with a dry atmosphere. This means that watering must be carefully done, so as not to splash water about unnecessarily.

Throughout the whole of the crossing period strict attention must be paid to the control of insect pests, spraying when the plants are outdoors and fumigating inside, otherwise aphid or thrip may pierce right down the inflorescence and prevent fertilization. When the calyx swells and the heads seem firm, it indicates that success in fertilization has been achieved. The time taken in the process of developing and ripening of the heads is usually six to eight weeks. To test when the heads are ready to rub out, a slight pressure with the thumb on top of the heads will show if the parts break up easily, but should there be any resistance and green colour at the base, then a little longer time is required. When harvesting a head, cut off and carefully rub the inflorescence

apart. I find it better to rub on to a piece of paper and pick out each seed with a pair of tweezers.

Good seed is that which has a shiny appearance and may be likened to caraway seed. Place each cross in separate seed packets, with the correct naming written on the outside. Store in a dry place until the sowing time comes round.

SOWING THE SEED

This is best done in February and the temperature should not be less than fifty-five degrees. Make up the seed trays with a light mixture of riddled loam, sand and clean riddled leaves. Make sure the corners of the tray are firmly filled and press the whole fairly firm. Soil should be moist. Sow the seed thinly. Some raisers sow them singly, but this depends on how much seed you have to sow. Sieve some fine soil over the tray; enough to nicely cover the seed. Cover with glass over the tray, and place upon a damp layer of ashes. It is a good plan to supply a slug destroyer around the vicinity for the sake of safety. Seedlings should appear in two to three weeks, to be eventually pricked off into a rougher compost when true leaves appear.

POTTING ON

Seedlings should be potted when ready into 3-inch pots and afterwards into 6-inch pots, in a compost as recommended for general cultivation. The plants are then grown in the ordinary way. No stopping is given and they will flower on the first bud that appears. Remove into the greenhouse about mid-September and carry out the general routine as for ordinary cultivation.

SPOTTING THE WINNERS

This requires a practised eye and a good deal of experience, and should an amateur have a batch of seedlings coming into flower he would be advised to call in an experienced raiser to assist him in selection. The percentage of good varieties is sometimes very low, as low as one in fifty; much of course depends upon particular

crosses, but the expert has knowledge of the crosses which should give good results, not only in percentage but in excellence. The time between the flowering of a seedling and distribution to the public is three to five years. Stopping dates have to be determined, stock has to be multiplied, dominant or recessive characters have to be determined and other considerations of inheritance decided. To raise a variety worthy of naming or one which will receive an award is the aim and dream of every raiser, but may I warn you that the standard is very high.

26

DECORATION IN THE HOME

OF all flowers used for decoration in the home, the chrysanthemum is supreme; its colour in the dull days of the year and its lasting qualities make it indispensable.

CUTTING FOR THE HOUSE

When flowers are being cut for indoor decoration it is well to cut them cleanly with a sharp knife and put immediately into deep water-containers. Foliage from the lower half of the stem should be removed, for if left on it becomes a great drain upon the water content of the stem and flower. If the flowers have heavy or large foliage, then remove all but the two pairs at the top. Flowers should not be used in the receptacles of the house until they have been in the deep buckets at least twelve hours in a cool place. The idea is to really well charge the stems with water; flowers which are sent to the markets have always been treated in this way at the nurseries. Various chemical substances are advertised, claiming that flowers keep longer and fresher by its use, but I think care in changing the water every few days is far more important, in addition to removing receptacles from hot rooms each evening.

FLOWER HOLDERS

Whatever the size, type or shape of containers, a fixing material is necessary. The more shallow bowls are quite satisfactory with the metal pincushion holder, on to which the stems are pushed to hold the flowers firmly. In deeper containers nothing is so satis-

factory as crumpled wire netting. With a little practice this can be folded up in a way that freely admits the stem and at the same time holds the flower in the desired position.

DESIGN AND FOLIAGE

Design is often controlled by the kind of container used. Flowers can be arranged horizontally at the base in an elongated bowl, whereas in an ordinary vase this is not possible. It is always pleasing to see a nicely arranged design, one in which the flowers are not crowded together and the foliage used shown to advantage. As a general rule, bright green foliage should be used with white flowers. Pink flowers can have purple or reddish foliage. Yellow flowers look well with orange or scarlet foliage. Salmon and fawn colours go well with rhododendron foliage which is turning colour in the autumn, whilst croton foliage is very dainty with flowers of orange and bronze shades.

It is understood that one has to use what material is at hand, but there are wonderful colours in autumn foliage in many gardens, and it is often a matter of choosing something which, while it may be quite ordinary in its natural setting, is really outstanding when associated with another colour. Carrot leaves which are turning scarlet are really grand, and sometimes yellow cabbage leaves make a good blending with bronze.

It is, as you will see, not always the most expensive foliage which is most effective; for instance, the lovely rosy purple kale is wonderful with salmon flowers.

COLOUR OF CONTAINERS

This item, too, is worthy of consideration. White flowers, black or white; pink flowers, green; salmon flowers, gold; yellow flowers, mahogany or dark bronze and copper; red and scarlet flowers, brass or copper. To see a well-arranged, well-blended design in all its aspects is certainly a joy—and one never knows, an expert may admire it one day.

There are many ladies' flower clubs up and down the land, and for an individual who may be interested it is in my opinion well worth while to become a member. It is amazing to note the improvement shown by members of various clubs after listening to lectures and seeing demonstrations given by well-known flower artists, for surely it is sacrilege to see flowers bunched closely together as if they were worth nothing. There is also room for much improvement in design and arrangement at many of our flower shows.

INDEX

- ANEMONE CHRYSANTHEMUMS 48
 - Selection of Varieties 48
- CHRYSANTHEMUM FERTILIZERS 35
- CHRYSANTHEMUMS OF JAPAN 96
 - Edible Varieties 96
- CHRYSANTHEMUMS FROM SEED 114
 - Bud Production 114
 - Cross-Pollination 115
 - Cultivation 114
 - Labelling 117
 - Organs of the flower 116
 - Seed Saving 117
 - Selecting Seedlings 118
 - Sowing Seed 118
- CHRYSANTHEMUM SPORTS 105
- CLASSIFICATION 107
- CROCKING THE POTS 51
- CUTTING, PACKING AND EXHIBITING
 - 75
 - Hurdle Box for large blooms 76
 - Ring Wire for large blooms 77
 - Staging for large blooms 77
- CUTTINGS
 - Covering or shading cuttings 28
 - Dates for inserting cuttings 30
 - Inserting 28
- DISEASES 102
 - Leafy Gall 104
 - Mildew 102
 - Mosaic 104
 - Rust 102
 - Verticillium 103
- DWARF CHRYSANTHEMUMS 94
 - Stopping 95
 - Selection of Varieties 95
- EARLY FLOWERING CHRYSANTHE-
MUMS 57
 - Paper bags 61
 - Planting out 58
 - Preparation of site 58
 - Propagation of 57
 - Shading of outdoor blooms 60
 - Staking 59
 - Stopping and timing 60
 - Transplanting into frame 58
 - Treatment of stools 62
 - Selection of Varieties 62
- EARLY SINGLE CHRYSANTHEMUMS 92
 - Selection of Varieties 92
- EDIBLE CHRYSANTHEMUMS 19
- EXHIBITING LARGE BLOOMS 78
 - Decoratives 78
 - Incurved 78
 - Singles 78

- FANTASIES, Varieties of 18
- GENETICS OF MUTATIONS 105
- GENE MECHANISM 106
- HISTORY OF THE CHRYSANTHEMUM
13
- HOME DECORATION 120
Containers 120
Design and foliage 121
Flower holders 120
- HORMONES 30
- HOURS OF DARKENING 16
- INCURVED CHRYSANTHEMUMS 84
Attention to flowers 84
Selection of Varieties 85
- INDOOR FLOWERING IN COLD
HOUSES 110
Selection of Varieties 111
- JAPANESE FANTASIES 17
- KOREAN CHRYSANTHEMUMS 89
Selection of Varieties 89
- LARGE EXHIBITION CHRYSANTHE-
MUMS 36
Apparatus for control of
mildew 42
Artificial heat 42
Compost for 36, 40
Final potting 40
First potting 37
Fumigation 42
Housing 41
Plant support 41
Protection from frost 39
- Top dressing 41
Watering 37
Selection of Varieties 43
- METHOD OF DARKENING 16
- N.C.S. SCHEDULE OF SECTIONS,
107, 108, 109
- NOVEMBER SINGLES 79
Stopping 79
Selection of Varieties 80
- OUTDOOR POMPONES 90
Selection of Varieties 90
- PERPETUAL FLOWERING CHRYSAN-
THEMUMS 88
- PESTS 98
Aphis 99
Capsid 99
Cuckoo Spit 102
Earwig 99
Eelworm 100
Leaf Miner 100
Leatherjacket 102
Midge 101
Thrip 99
Wireworm 101
- PHOTO PERIODISM 15
- POMPONE CHRYSANTHEMUMS 50
Selection of Varieties 50
- POTTING AND WATERING 51
- SOILS AND FERTILIZERS 32
- SPECIMEN PLANTS 21
- STOPPING AND TIMING 20

- Reasons for 20
- Stopping Key 21
- STOPPING OF EARLY FLOWERING
 - VARIETIES 22
 - Compost for 27
 - Propagation 26
- SUMMER QUARTERS 52
- SUPPORTING ROWS OF POTS 53
- TEMPERATURE AND CONTROL OF
 - BUDS 15
 - TEMPERATURE FOR ROOTING 31
 - TURF 32
 - Chemical elements 33
 - Height of stack 33
 - Lime content 33
 - Stacking turf 33
 - VERNALIZATION 15
 - WATERING 52